REPORT

UPGRADES TO MELROSE PARK PUBLIC SCHOOL

110 WHARF ROAD, MELROSE PARK, NSW 2114

NOISE & VIBRATION IMPACT ASSESSMENT
RWDI # 2505859
April 11, 2025

SUBMITTED TO

NSW Department of Education

SUBMITTED BY

Alex Jang
Project Engineer
Alex.Jang@rwdi.com

Justin Leong
Consultant – Noise & Vibration
Justin.Leong@rwdi.com

RWDI Australia Pty Ltd
ABN 86 641 303 871

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PROPOSAL

The Melrose Park Public School is to undergo upgrades within a one to three-storey built form, including:

- Demolition of existing school buildings;
- Site preparation works including tree removal;
- Construction of the following buildings:
  - **Block A**: One (1) storey building comprising:
    - universal pre-school;
    - outdoor play area for the UPS; and
    - detached storeroom;
  - **Block B1**: Two (2) storey building comprising:
    - staff and administration areas;
    - library;
    - 4 special programs rooms;
    - Pedestrian bridge to Block B2;
  - **Block B2:** Three (3) storey building comprising:
    - 23 classrooms;
    - amenities/services cores; and
    - pedestrian bridge to Block B3;
  - **Block B3:** Three (3) storey building comprising:
    - 12 classrooms; and
    - amenities/services cores;
  - **Block C**: One (1) storey building comprising:
    - hall;
    - amenities;
    - canteen;
    - OSHC; and
    - COLA;
- Construction of two (2) car parking areas; and
- Landscaping works.

BACKGROUND

1. Introduction

This Noise and Vibration Impact Assessment has been prepared to accompany a Review of Environmental Factors (REF) for an activity proposed by the Department of Education under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and *State Environmental Planning Policy (Transport and Infrastructure) 2021* (SEPP TI).

This document has been prepared in accordance with the *Guidelines for Division 5.1 assessments* (the Guidelines) by Department of Planning, Housing and Infrastructure.

2. Site Description

Melrose Park Public School is located at 110 Wharf Road, Melrose Park and is legally known as Lot 3 in DP 535298 with an approximate site area of 2.5 hectares. The site has a frontage to Wharf Road (east), Mary Street

(South), and Waratah Street (west). The site is adjoined by 2-3 storey light industrial development to the north, 1-2 storey industrial and commercial developments to the south, residential dwellings to the east and industrial and commercial development to the west.

An aerial photograph of the site is provided in Figure 1-1 below.

Figure 1-1 Aerial Photograph

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

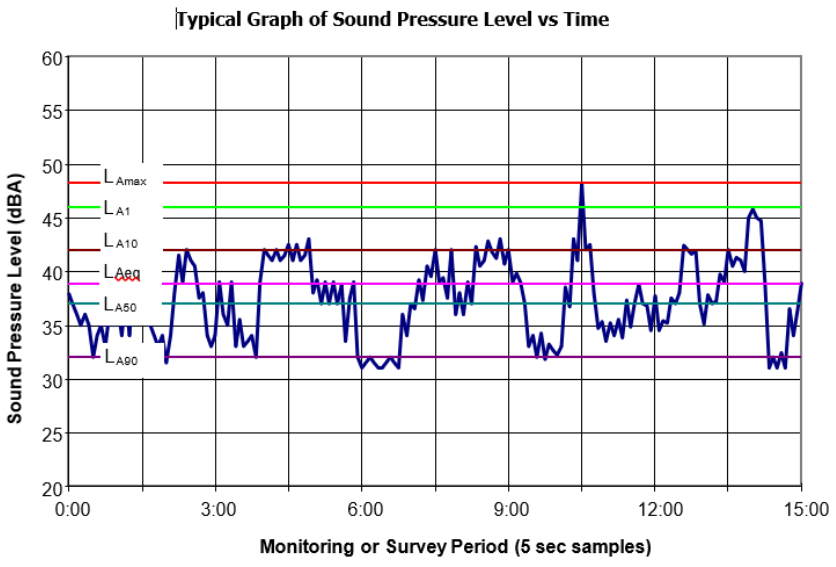
L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.



1 INTRODUCTION

This report presents the results of the noise and vibration impact assessment undertaken for the proposed redevelopment of Melrose Park Public School (the site) located at 110 Wharf Road, Melrose Park.

This assessment has been prepared based on the following documentation:

- Architectural Package issued For Information prepared by PTW Architects (dated November 2024).
- Preliminary mechanical services layouts prepared by Arcadis and supplied to RWDI on 11 December, 2024.
- Melrose Park Transport Management and Accessibility Plan prepared by Jacobs, dated 24 January 2019, as well as preliminary traffic advice provided by TTW on the 18 December, 2024.

The following guidelines and standards have been referenced in this NVIA:

- *Noise Policy for Industry* (NSW EPA, 2017) *(NPfI);*
- *Road Noise Policy* (EPA, 2011) *(RNP);*
- *Interim Construction Noise Guideline* (NSW EPA, 2009) *(ICNG);*
- Transport for NSW *Construction Noise & Vibration Strategy* (TfNSW, 2023);
- British Standard BS 7385:1993;
- German Standard DIN 4150:2016.

2 PROJECT DESCRIPTION

2.1 Site Location and Surrounding Receivers

Melrose Park Public School is located at 110 Wharf Road, Melrose Park and is legally known as Lot 3 in DP 535298 with an approximate site area of 2.5 hectares. The site has a frontage to Wharf Road (east), Mary Street (south), and Waratah Street (west). The potentially most affected noise receivers around the site are as follows:

- Receiver Area R1: One and two storey residential dwellings to the east of the site across Wharf Road.
- Receiver Area R2: Mix of commercial and industrial development to the south of the site across Mary Street. Future residential development is proposed at this receiver location, and so this receiver will be assessed as a residential use for the purposes of the operational noise emission assessment in this report.
- Receiver Area R3: Mix of commercial and industrial development to the west of the site across Waratah Street. Future residential development is proposed at this receiver location, and so this receiver will be assessed as a residential use for the purposes of the operational noise emission assessment in this report.
- Receiver Area I4: Industrial development to the immediate north of the site.

An aerial photograph of the site is provided in Figure 2-1 below.

Figure 2-1 Aerial Photograph

Existing or Future Residential Receivers

Industrial Receivers

2.2 Proposed Development

The activity is for upgrades to Melrose Park Public School to provide for a maximum capacity of 780 students within a one to three-storey built form, including:

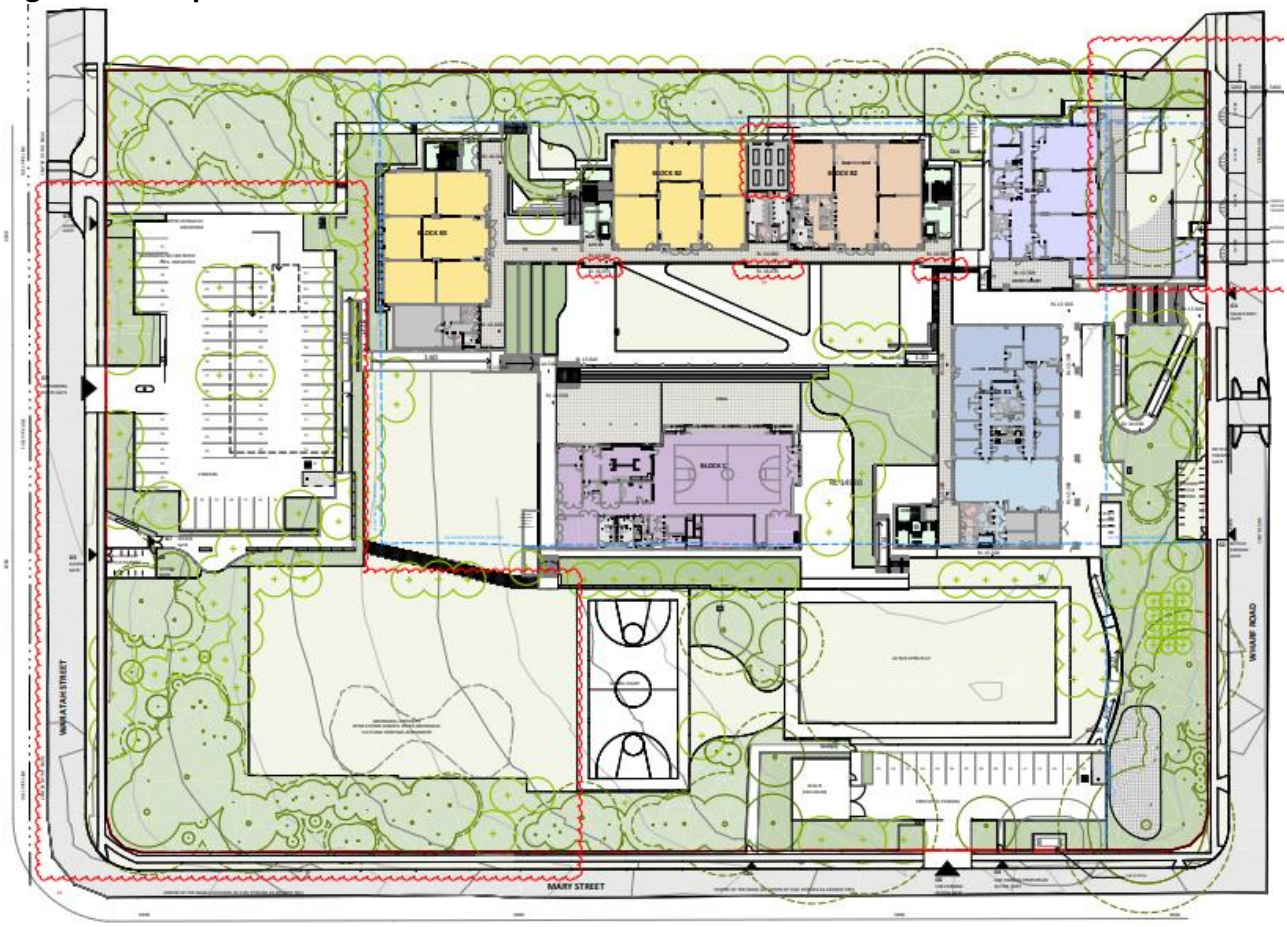
- Demolition of existing school buildings;
- Site preparation works;
- Construction of the following buildings:
  - **Block A**: One (1) storey building comprising:
    - Universal pre-school
    - Outdoor play area for the UPS; and
    - Detached storeroom;
  - **Block B1**: Two (2) storey building comprising:
    - Staff and administration areas;
    - Library;
    - 4 special program rooms;
    - Pedestrian bridge to Block B2;
  - **Block B2**: Three (3) storey building comprising:
    - 23 classrooms;
    - Amenities/services cores; and
    - Pedestrian bridge to Block B3;
  - **Block B3**: Three (3) storey building comprising:
    - 12 classrooms; and
    - Amenities/services cores;
  - **Block C**: One (1) storey building comprising:
    - Hall;
    - Amenities
    - Canteen;
    - OSHC; and
    - COLA;
- Construction of two car parks; and
- Landscaping works.

The anticipated operational hours of the school are as follows:

- Main school: 8.45am to 3.05pm
- Pre School: 8.45am to 3.05pm
- Before school care: 6.00am-8:35am
- After school care: 3:05pm-6.00pm
- Vacation care (during school holidays): 6.00am-6.00pm

The proposed site ground floor layout is shown for reference in Figure 2-2.

Figure 2-2 Proposed Ground Floor Site Plan



3 EXISTING NOISE ENVIRONMENT

3.1 Noise Monitoring

Attended and unattended noise monitoring was conducted to quantify the existing noise environment surrounding the site. Figure 3-1 presents the locations of noise monitoring, with long terms unattended noise monitoring being conducted between 11th October 2024 and 23rd October 2024.

Instrumentation for the survey comprised of the following:

Table 3-1 Noise Monitoring Equipment

Instrumentation	Manufacturer	Model	Serial Number
Sound Level Meter	NTi	XL2	A2A-08006-E0
	Ngara		878002
			878007
			878042
Sound Calibrator	GRAS	42AG	279772

Each Sound Level Meter was fitted with a microphone windshield. Calibration of each logger was checked prior to and following measurements. Drift in calibration did not exceed ±0.5 dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Noise monitoring was completed in accordance with Australian Standard AS 1055-2018 "*Acoustics - Description and measurement of environmental noise*". All acoustic instrumentation utilised complies with AS IEC 61672.1-2004 *"Electroacoustics - Sound level meters – Specifications".*

Figure 3-1 Noise Monitoring Locations

3.2 Background Noise Levels

Unattended noise monitoring was conducted at three locations. The measured data was processed in accordance with the *NPfI* requirements. The noise monitor at Location LT1 was installed at 6 Hope Street, Melrose Park (Computershare). The noise monitor at Location LT2 was installed at 1 Mary Street (MX Architects). The noise monitor at Location LT3 was installed at 101 Wharf Road.

Table 3-2 details the ambient noise levels (L_{Aeq}) and Rating Background Levels (RBL) logged during the daytime, evening, and night periods. Refer to Appendix B for graphs of the noise monitoring data.

Table 3-2 Unattended Noise Monitoring Results – Ambient and Background Noise Levels, dBA

Location	Time Period[1]	Ambient Noise Levels, $L_{Aeq\ (period)}$ dBA	RBL, $L_{A90\ (period)}$ dBA
LT1	Day	57	44
	Evening	52	40
	Night	50	39
LT2	Day	56	41
	Evening	51	38
	Night	51	36

Location	Time Period[1]	Ambient Noise Levels, $L_{Aeq\ (period)}$ dBA	RBL, $L_{A90\ (period)}$ dBA
LT3	Day	61	44
	Evening	58	38
	Night	54	34

Note 1: Daytime (7am – 6pm), Evening (6pm – 10pm), and Night time (10pm – 7am).

4 OPERATIONAL NOISE ASSESSMENT

This section of the report addresses operational noise emissions from the proposed development.

4.1 Operational Noise Level Criteria

4.1.1 NSW EPA Noise Policy for Industry

The NSW EPA Noise Policy for Industry (NPfI) provides a framework and process for deriving noise criteria for consents and licences that enable the EPA and others to regulate premises that are scheduled under the Protection of the Environment Operations Act 1997. Whilst specifically aimed at assessment and control of noise from industrial premises regulated by the EPA, the policy is also appropriate for use by authorities such as the DP&E when assessing major development proposals.

The NPfI documents a procedure for assessment and management of industrial noise which involves the following steps:

- Determining the project noise trigger for a development. The project noise trigger level is a benchmark level above which noise management measures are required to be considered. They are derived by considering shot-term intrusiveness due to changes in the existing environment (applicable to residential receivers only) and maintaining noise level amenity for particular land uses for residents and other sensitive receivers;
- Predicting and measuring noise produced by the development (having regard to any associated annoying characteristics and prevailing meteorological effects);
- Comparing the predicted or measured noise level with project noise trigger level and assessing impacts and the need for noise mitigation and management measures;
- Considering any residual noise impacts following the application of feasible and reasonable noise mitigation measures;
- Setting statutory compliance levels that reflect the best achievable and agreed noise limits for the development; and
- Monitoring and reporting environmental noise levels from the development.

4.1.1.1 Intrusiveness Noise Level

The intrusiveness noise level applies only to residential receivers and is the noise level 5 dB above the background noise level for each time period (daytime, evening or night-time). The Rating Background Level (RBL), representative of the background noise level, is derived from the measured L_{A90} noise levels measured on site, which have been presented in Table 3-2.

Intrusiveness noise criteria levels for the project are summarised in Table 4-1. To provide a conservative assessment, the lowest background noise levels measured at all of the noise monitoring locations have been adopted in establishing the Intrusiveness Noise criteria.

Table 4-1 Project Intrusiveness Noise Levels

Assessment Period [1]	Measured Rating Background Level (RBL) $L_{Aeq,\ period}$ dBA	Project Intrusiveness Noise Level $L_{Aeq,\ 15min}$ dBA
Day	41	46
Evening	38	43
Night	34	39

Note 1: Day = 7am – 6pm; Evening = 6pm – 10pm; Night = 10pm – 7am,

4.1.1.2 Amenity Noise Level

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include transportation noise (when on public transport corridors), noise from motor sport, construction noise, community noise, blasting, shooting ranges, occupational workplace noise, wind farms, amplified music/patron noise.

The amenity noise level aims to limit continuing increases in noise levels which may occur if the intrusiveness level alone is applied to successive development within an area.

The recommended amenity noise level represents the objective for total industrial noise at a receiver location. The project amenity noise level represents the objective for noise from a single industrial development at a receiver location.

To prevent increases in industrial noise due to the cumulative effect of several developments, the project amenity noise level for each new source of industrial noise is set at 5dBA below the recommended amenity noise level.

The following exceptions apply to determining the project amenity noise level:

- For high-traffic areas, the amenity criterion for industrial noise becomes the $L_{Aeq,period(traffic)}$ minus 15dBA.
- In proposed developments in major industrial clusters.
- If the resulting project amenity noise level is 10dB or lower than the existing industrial noise level, the project amenity noise level can be set at 10dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.
- Where cumulative industrial noise is not a consideration because no other industries are present in, or likely to be introduced into the area, the relevant amenity noise level is assigned as the project amenity noise level for the development.

Amenity noise levels are not used directly as regulatory limits. They are used in combination with the project intrusiveness noise level to assess the potential impact of noise, assess mitigation options and determine achievable noise requirements.

Due to different averaging periods for the $L_{Aeq,15min}$ and $L_{Aeq,period}$ noise descriptors, the values of project intrusiveness and amenity noise levels cannot be compared directly when identifying noise trigger levels i.e. the most stringent values of each category. In order to make a comparison between descriptors, the NPfI assumes that the $L_{Aeq,15min}$ equivalent of an $L_{Aeq,period}$ noise level is equal to the $L_{Aeq,15min}$ level plus 3dB.

The project amenity noise levels for surrounding receivers are shown in Table 4-2. The most potentially affected residential receivers near the site are classified as being in a "suburban" noise amenity area.

Table 4-2 Recommended Amenity Noise Levels

Receiver	Noise Amenity Area	Time of Day [1]	Recommended Amenity Noise Level $L_{Aeq,period}$ dBA	Project Amenity Noise Level $L_{Aeq,period}$ dBA	Project Amenity Noise Level $L_{Aeq,15min}$ dBA
Residential	Suburban	Day	55	50	53
		Evening	45	40	43
		Night	40	35	38
Commercial		When in use	65	60	63
Industrial		When in use	70	65	68

Note 1: Daytime 7.00am–6.00pm; Evening 6.00pm–10.00pm; Night 10.00pm-7.00am.

4.1.1.3 Project Trigger Criteria

The project noise trigger levels (PNTLs) are defined as the lower of the project intrusiveness and the project amenity noise levels. The PNTLs are summarised in Table 4-3 below.

Table 4-3 *NPfI* Overall Project Trigger Noise Level Criteria

Location	Assessment Period [1]	Intrusiveness Criteria $L_{Aeq,15min}$ dBA	Amenity Criteria $L_{Aeq,15min}$ dBA	Project Noise Trigger Criteria $L_{Aeq,15min}$ dBA
Residential	Day	46	53	**46**
	Evening	43	43	**43**
	Night	39	38	**38**
Commercial	When in use	-	63	**63**
Industrial	When in use	-	68	**68**

Note 1: Day = 7am – 6pm; Evening = 6pm – 10pm; Night = 10pm – 7am

4.1.1.4 Sleep Disturbance

Guidance for assessing the potential for sleep disturbance impacts on nearby residences is provided in Section 2.5 of the NPfI, which states:

> *Where the subject development/premises night-time noise levels at a residential location exceed:*
>
> - $L_{Aeq,15min}$ 40 dBA or the prevailing RBL plus 5 dB, whichever is the greater, and/or
> - L_{Amax} 52 dBA or the prevailing RBL plus 15 dB, whichever is the greater,
>
> *a detailed maximum noise level event assessment should be undertaken.*

4.1.2 Speech/Recreational Noise from External Areas

There are no policies in New South Wales governing noise emissions from children within play areas of school facilities. Attempting to assign a level to noise generated by school children involved in outdoor play, predominantly during recess and lunch breaks and then comparing it with a predetermined criterion for the purposes of assessing "offensiveness", is inappropriate. It is difficult to imagine any school from which these emissions could, or would, comply with any 'typical' intrusiveness-based criterion. Being an essential part of every residential community, schools are located to permit ready access to students and, by definition, are generally surrounded by residential premises. An assessment based on a comparison between a measured and/or predicted level with a specific criterion may set an undesirable precedent for both existing and future schools.

Notwithstanding the above, a qualitative assessment of noise impacts from use of the outdoor areas has been undertaken comparing the noise emissions predicted from the current school capacity and playground layout with the proposed future capacity and layout.

Noise emissions from general classroom activities will generally be contained within internal areas of the school and are not expected to result in any adverse noise impacts on surrounding receivers. As a result, no assessment of noise emissions from classroom activities has been undertaken in this assessment.

4.2 Assessment of Operational Noise

Noise emissions from the proposed development have been predicted using the noise modelling software Cadna v2025, implementing the algorithms outlined in ISO 9613-2: Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation.

The primary sources of noise generation identified from the site are as follows:

- Mechanical plant noise.
- Noise from vehicles manoeuvring within the site's carparks.
- Passive recreational noise from students occupying the external play areas.

4.2.1 Mechanical Services and Vehicle Noise Assessment

4.2.1.1 Mechanical Services Noise Sources

The preliminary mechanical services plans indicate that external mechanical services will be located in the following locations:

- Three Ground Floor plant rooms/areas in Blocks A, B2 and B3 housing air conditioning condenser units, with a 70% open area mesh proposed on the northern façade of Block B2, and ventilation louvres on the western and southern façades for Block B3.
- One first floor plantroom in Block B1 housing air conditioning condenser units, with ventilation louvres on the eastern and southern facades.
- One ground floor plantroom in Block B1 housing a fire services pump, with ventilation louvres on the eastern facade.
- One plant deck located externally at high level at the south-western corner of Block C.

The indicative locations of the mechanical services are shown in Figure 4-1 to Figure 4-4.

Figure 4-1 Location of Mechanical Services - Block A

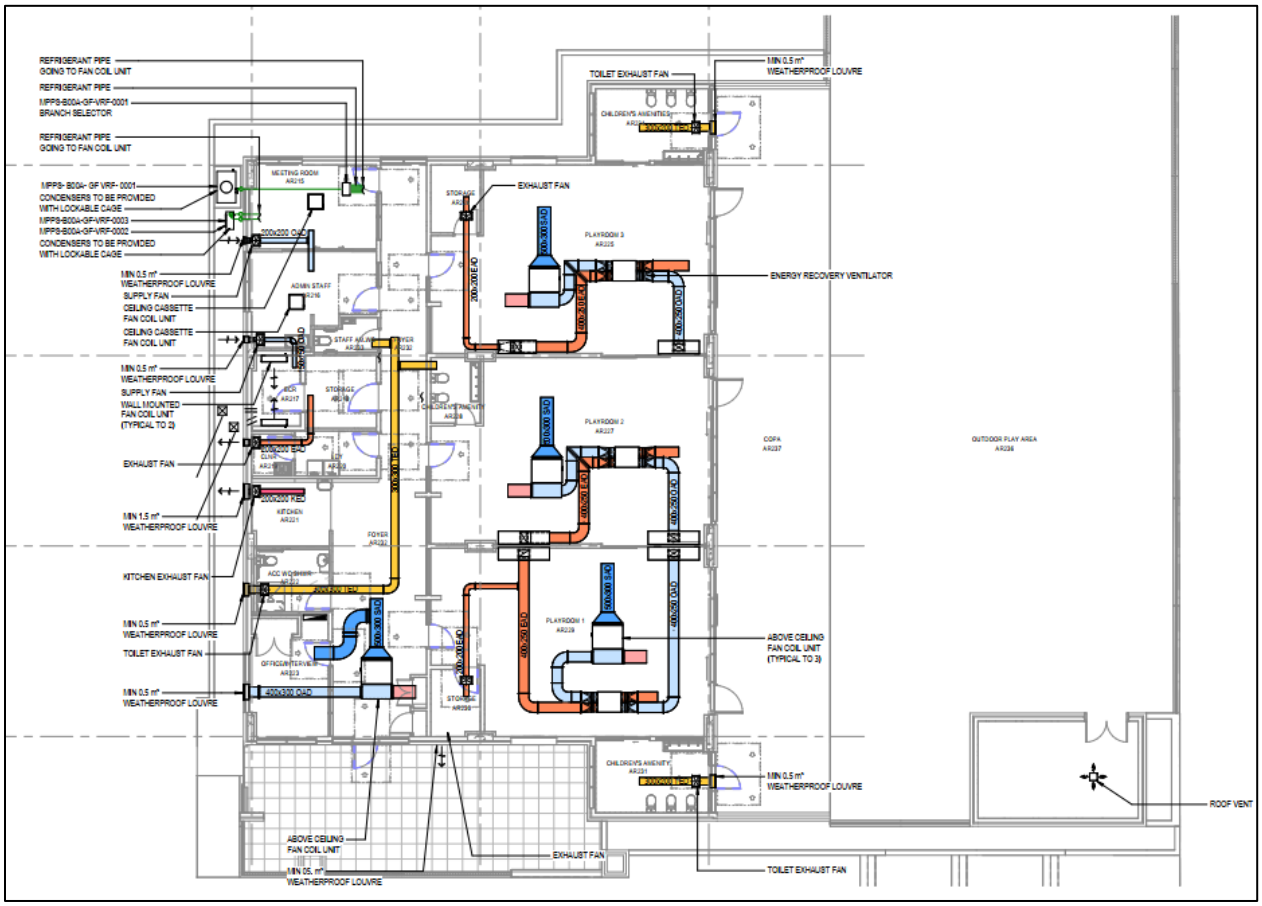


Figure 4-2 Location of Mechanical Services - Block B1

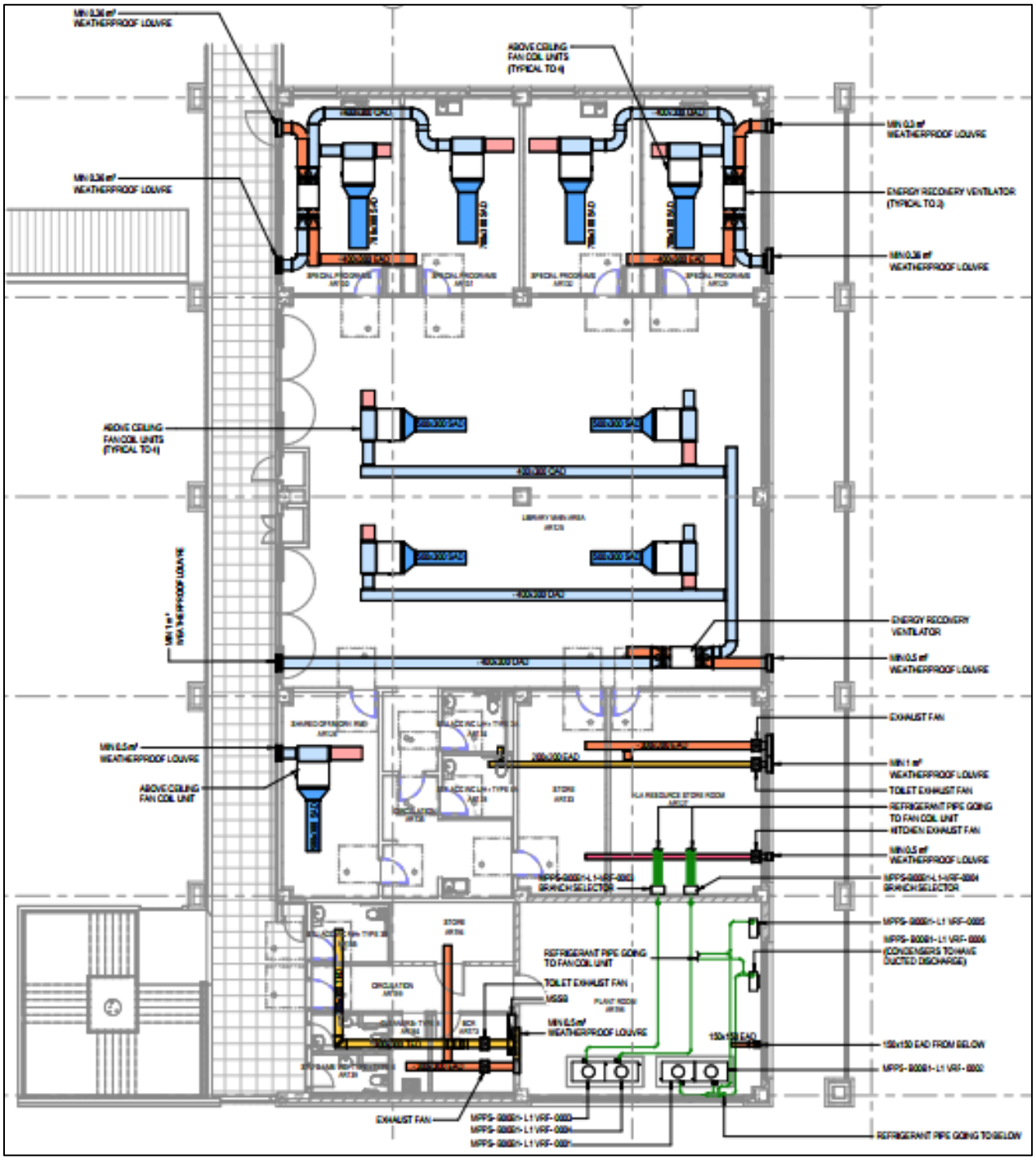


Figure 4-3 Location of Mechanical Services - Block B2

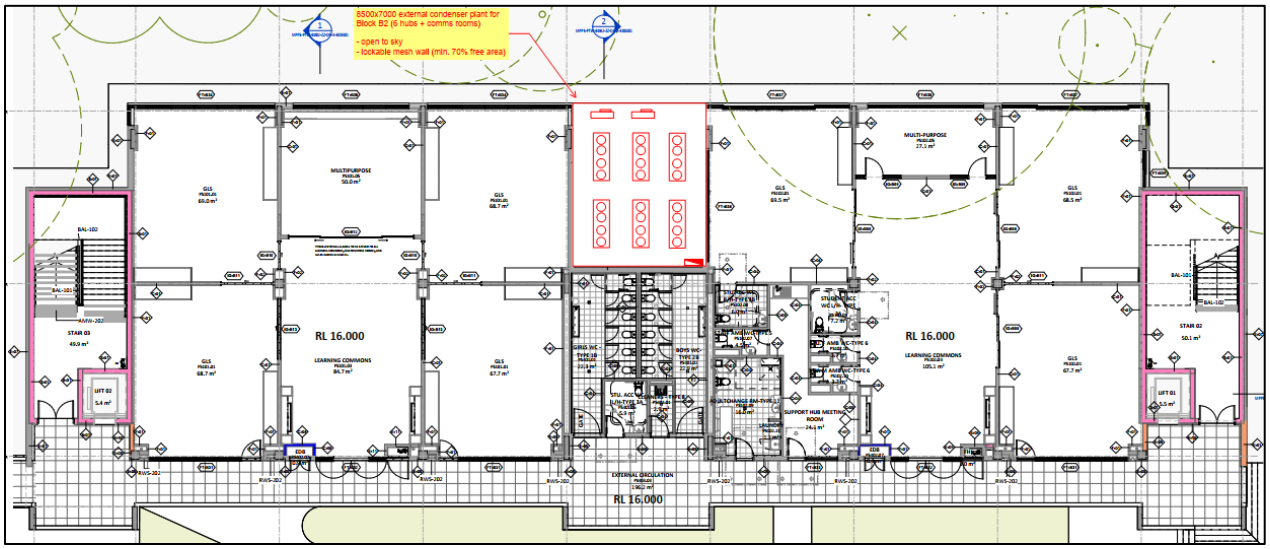


Figure 4-4 Location of Mechanical Services - Block B3

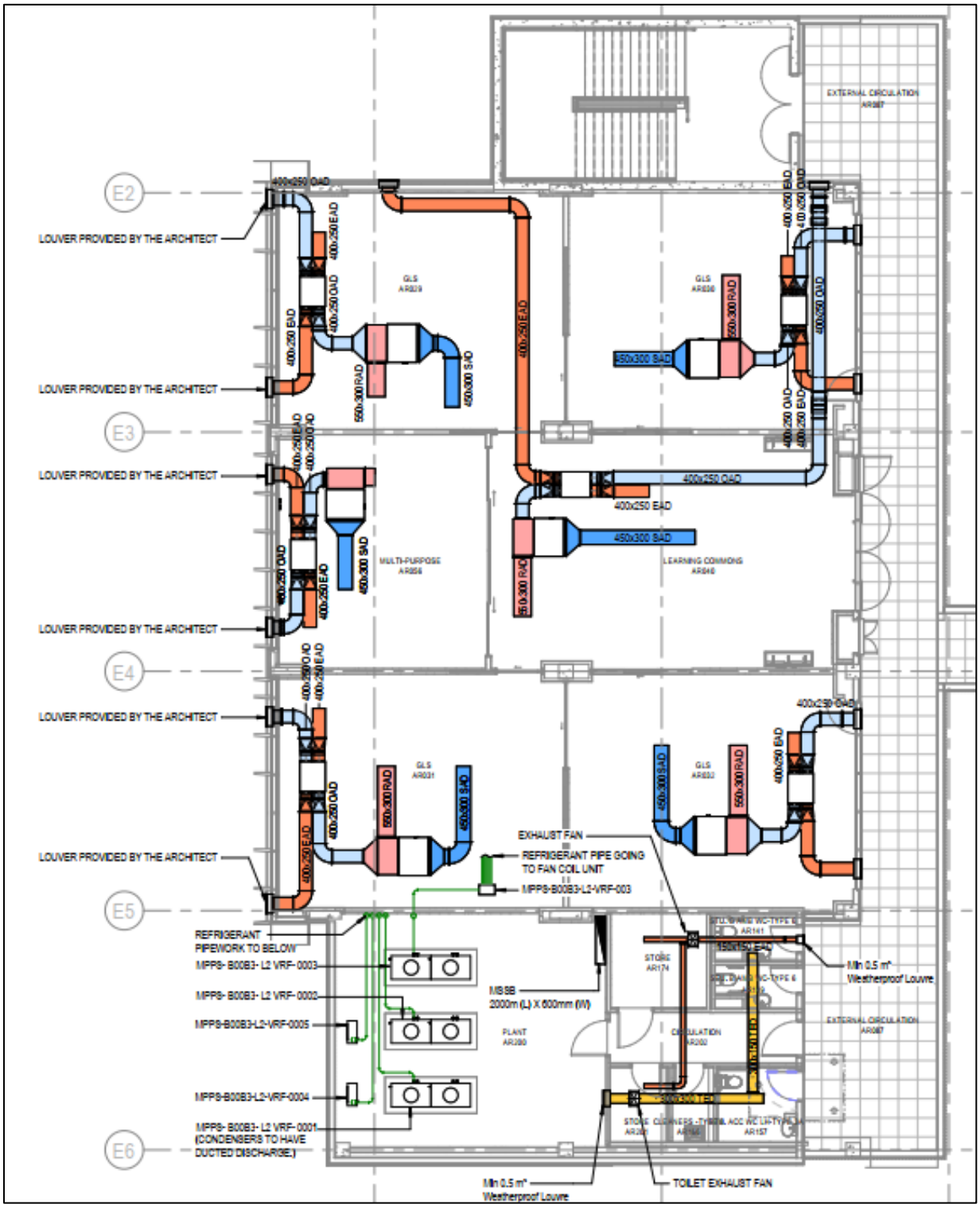
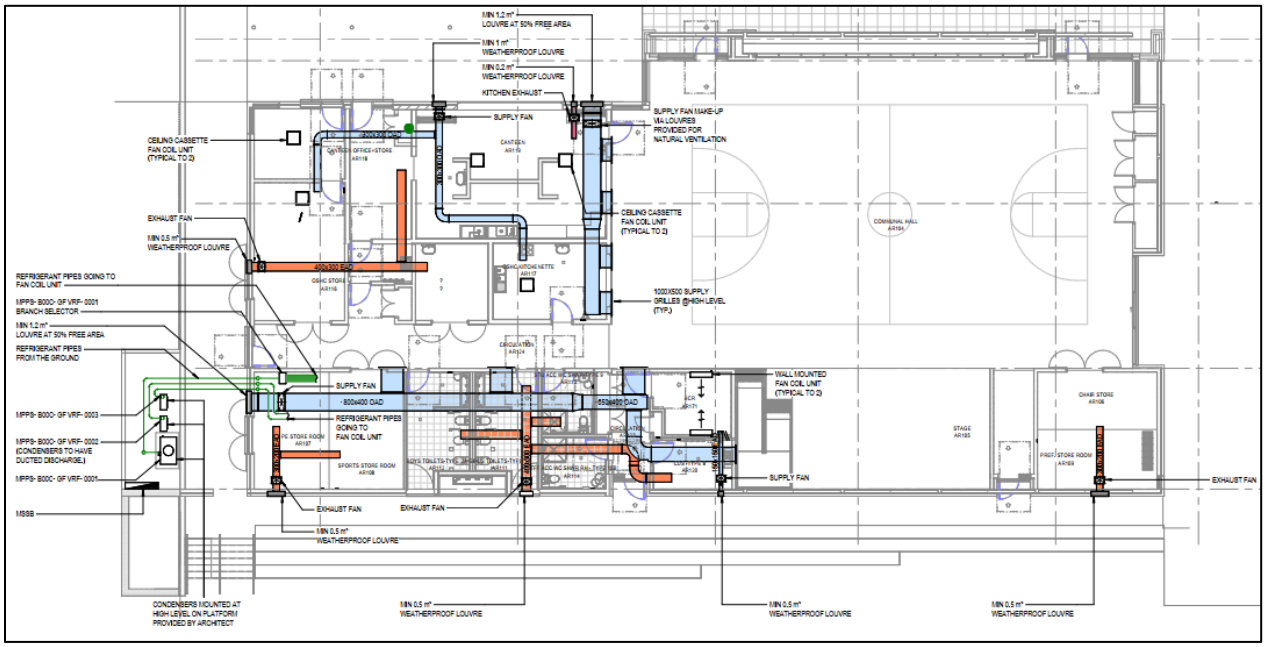


Figure 4-5 Location of Mechanical Services - Block C



Preliminary noise data for the external mechanical services equipment are presented in Table 4-4.

Table 4-4 Preliminary Mechanical Plant Selections

Location	Nominal Unit	Sound Pressure Level at 1m for Each Unit, dBA
Block A Plant Area	2-Off PUMY-P112VKM4	51
	1-Off PURY-P450YNW-A(-BS)	66
Block B1 Plant Room	2-Off PUMY-P112VKM4	51
	1-Off PURY-P650YSNW-A (-BS)	65
	1-Off PURY-P700YSNW-A(BS)	66
Block B2 External Plant Area	2-Off PUMY-P112VKM4	51
	4-Off PURY-P700YSNW-A(BS)	66
	2-Off PURY-P750YSNW-A(BS)	67
Block B3 External Plant Area	2-Off PUMY-P112VKM4	51
	2-Off PURY-P700YSNW-A(BS)	66
	1-Off PURY-P750YSNW-A(BS)	67
Block C Plant Area	2-Off PUMY-P112VKM4	51
	1-Off PURY-P200YNW-A (-BS)	59

It is also understood that a fire pump is proposed to be located internally in the Block B1 plantroom. While it will not be constantly running, it is anticipated that it will be tested on a regular basis. It is recommended that

this testing only be conducted during the daytime period, and as such, noise from this should be designed so that it conforms with the daytime noise trigger level outlined in Section 4.1.1.3.

4.2.1.2 Vehicle Noise Sources

Based on the indicative predicted peak hour vehicle trips for the site's carparks (as informed by the traffic engineer TTW), the modelling of noise emissions from the site's carparks has been based on the following assumptions:

- 14 vehicles entering the Waratah Street carpark during a single 15 minute period;
- 4 vehicles entering and 4 vehicles leaving the Mary Street carpark in a single 15 minute period.

The noise level of a car manoeuvring at 10km/hr within the carparks has been modelled with a sound power level of 85 dBA L_{Aeq}.

We note that the majority of vehicles dropping off/picking up students will use the drop off zones that are located on the public roads surrounding the site, rather than entering into the school's carparks. Noise from these vehicles has not been included within the on-site operational noise modelling.

Noise from the vehicles while on public roads will be assessed against the EPA's Road Noise Policy (see section 5).

4.2.1.3 Predicted Noise Levels

Based on the noise modelling assumptions presented in sections 4.2.1.1 and 4.2.1.2, the noise emission predictions for mechanical/vehicle noise are shown in Table 4-5. Noise emissions from mechanical plant and vehicles manoeuvring on site are predicted to be compliant with the noise criteria at all receivers.

Table 4-5 Predicted Noise Emissions from Mechanical Plant and Vehicle Noise $L_{Aeq(15min)}$ dBA

Receiver	Predicted Worst Case Noise Level $L_{Aeq,15min}$ dBA	Criteria (Daytime) $L_{Aeq,15min}$ dBA	Complies (Y/N)
R1: Residential to East	40	46	Y
R2: Future Residential to South	41	46	Y
R3: Future Residential to West	42	46	Y
I4: Industrial to North	56	68 (when in use)	Y

4.2.2 Sleep Disturbance Assessment

As out of school hours childcare and vacation day care may open from 6am, a sleep disturbance assessment has also been conducted of noise emissions from the site's carpark. Noise from car doors closing have been assessed as part of the sleep disturbance assessment. An L_{Amax} of 92 dBA has been assumed for a car door slam.

Predicted noise levels for the sleep disturbance assessment are shown in Table 4-6 and have been assessed against the L_{Max} sleep disturbance criteria of the NPfI (refer to section 4.1.1.4). Noise emissions are predicted to be compliant with the noise criteria at all receivers.

Table 4-6 Predicted Noise Emissions from Vehicle Noise L_{AMax} dBA (Sleep Disturbance Assessment)

Receiver	Predicted Worst Case Noise Level L_{AMax} dBA	Criteria L_{AMax} dBA	Complies (Y/N)
R1: Residential to East	44	54	Y
R2: Future Residential to South	51	54	Y
R3: Future Residential to West	50	54	Y

4.2.3 Speech/Recreational Noise from External Areas

4.2.3.1 Noise from Typical Operations

To the best of our knowledge, there have been no social surveys conducted to quantify the levels of noise generated from outdoor play areas of schools of varying size and type or to document the response of the surrounding community to the noise from school children engaged in outdoor play.

Whether this is due to the noise source being of a highly variable nature, making quantification of such emissions extremely difficult, or because this source is considered to be an integral part of any school development, is a point of some conjecture. Whilst attempts could certainly be made to measure the levels of noise which may be experienced at a nearby receiver, the reliability, statistical replication and relevance of such an assessment would always be open to question. In addition, the purpose of quantifying a noise source is to enable its comparison with a criterion which has been developed in consultation with appropriate parties, for the purpose of assessing the potential impact of the noise upon a receiver.

Outdoor play spaces are anticipated to be loudest during recess and lunch periods, with other activities (such as outdoor PE classes, or other classroom learning activities) to be smaller in scale, quieter, or both, compared to unstructured play. The noise levels generated during recess and lunch periods will vary according to the following factors:

- The number of students in the area.
- The location of the students relevant to the residences – as the distance between the source and the receiver increases, the noise level at the receiver will decrease.
- The level of noise made by each student – this is will vary from individual to individual, and various factors such as age, personality, mood, activity and countless other factors will play a part.

It is also noted that more noise-intensive activities (e.g. children screaming) are generally not capable of being sustained over an extended period of time.

A review was previously conducted of Land and Environment Court cases which may be of relevance to the assessment of this proposal. In the judgement of Justice Pain in the case of Meriden School v Pedavoli, noise from children playing outdoors was found to not constitute offensive noise. In the case of Christian Brothers v Waverley Council, no specific criteria were mentioned but Commissioner Murrell commented that,

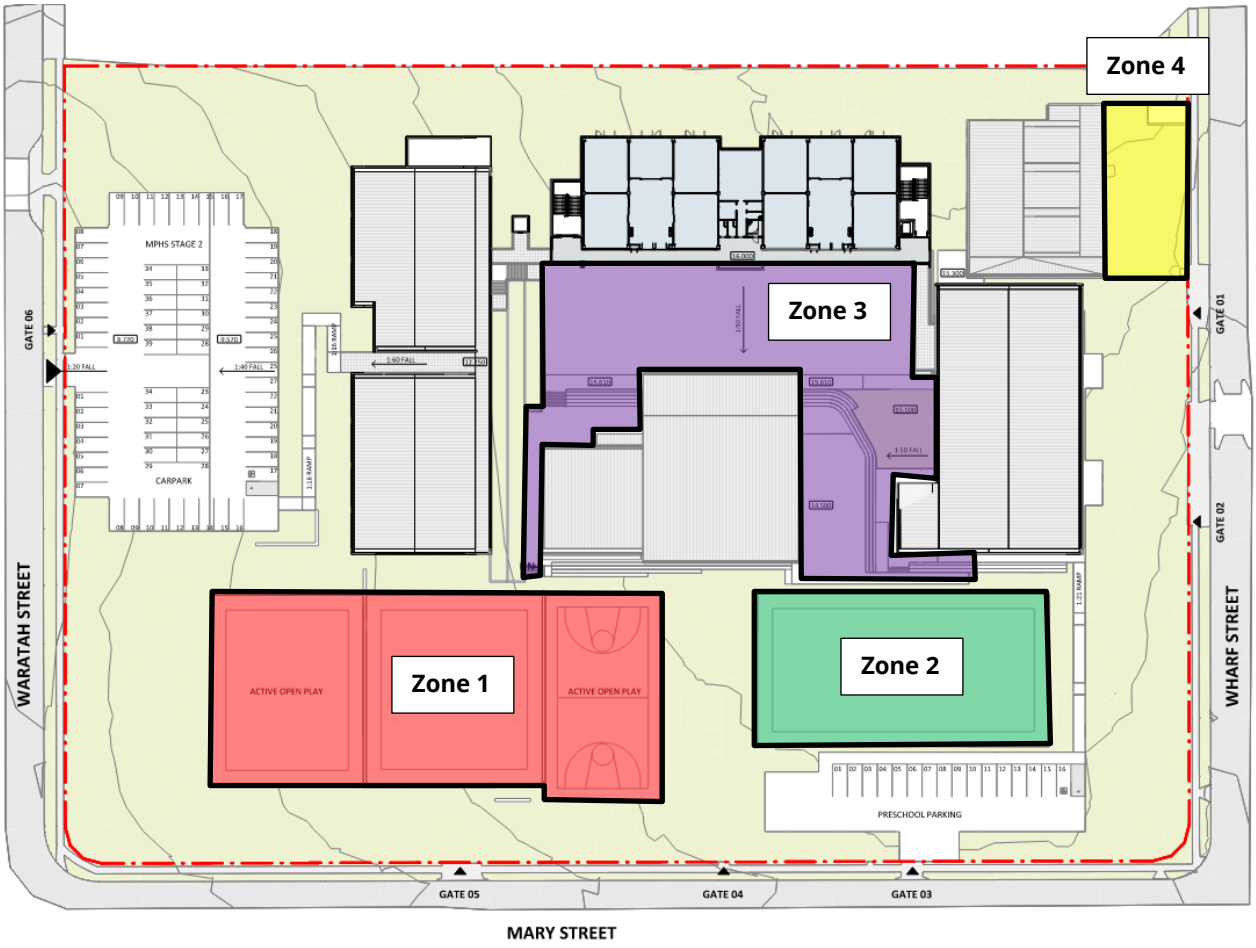
> *"It is important in our society for uses such as schools and residential areas to coexist".*

The following factors should be noted when considering the impact of noise generated by school children during outdoor play:

- The nature of the noise source is not inconsistent with that experienced within residential communities, and in this case, there is an existing school currently on site, and so there will be no introduction of any noise sources with a considerably different character to what the surrounding community is already exposed to;
- Noise from outdoor play generally occurs during short periods throughout the day within school hours; and
- The wider community benefits through the provision of the facility.

In order to present a comparative assessment of predicted existing noise levels and future noise levels, a sound power level of 95 dBA per 15 children has been conservatively adopted. In reality it is unlikely that all groups of children would be generating this level of noise simultaneously, particularly those engaged in more passive forms of play such as small group conversation. Children have been assumed to be distributed uniformly across the play area in all cases.

Figure 4-6 Play Zones



Compared to the predicted existing noise levels from children playing, noise levels from children's play from the proposed redevelopment are predicted to marginally increase at receivers to the west of the site and some residential receivers to the east of the site.

However, there is predicted to be a significant increase in noise levels at some residents to the east of the site (particularly those directly across Wharf Road from the Zone 2 and Zone 4 play areas), and receivers to the south of the site which are near the large Zone 1 and Zone 2 play areas. The largest increase in noise level is predicted to be in the order of 18 dB at the southern receivers, and 10 dB at the eastern receivers. Apart from an initial step change increase in noise levels which is anticipated following the demolition of existing buildings (as this will remove acoustic shielding between some of the current play areas and the surrounding receivers), the increase in children's play noise levels at receivers will be gradual over a period of years as school enrolments increase.

4.2.3.2 Noise from Functions Outside of School Hours

Use of the school for functions outside of school hours is expected to be infrequent. Noise emissions from out of school hours functions should be considered on a case by case basis if these are proposed to occur.

4.2.4 Operational Noise Recommendations

Based on the review of noise emissions from the development, indicative recommendations are provided in the following sub-sections in order for the development to comply with the nominated noise emission requirements.

4.2.4.1 Mechanical Services

The predicted noise emissions presented in Table 4-5 reveal that noise emissions from the development's mechanical plant can be mitigated through considered design and the implementation of standard noise mitigation treatments.

Requirements for mechanical services will be dependent on the final selections of equipment, location and number of plantrooms, and size of mechanical services louvres.

Noise from the mechanical plant should be assessed at detailed design stage, with appropriate mitigation measures determined to achieve compliance with the project noise trigger levels of the NPfI.

4.2.4.2 Outdoor Areas

The following mitigation and management measures are recommended with regards to noise from children playing outside:

- Children in outdoor play areas are to be supervised by staff to manage any excessive noisy behaviour.
- Regarding out of school hours childcare and vacation day care, outdoor play should not occur before 7am.
- The school should maintain a complaints register.

4.2.4.3 School Announcements and Bells

Announcements and school bells are typical activities associated with school operations. Typically, these are produced by the school PA system and can vary significantly depending on the final volume settings of the system.

The following measures should be adopted where new bells and speakers are proposed to assist in minimising noise impacts at surrounding residences:

- Speakers should be located and orientated to provide good coverage of the school areas whilst being directed away from residences. The coverage of the system should be subject of the detail design of the system.
- The volume of the system should be adjusted on site so that announcements and bells are clearly audible on the school site without being excessive.
- Once the appropriate level has been determined on site, the system should be limited to the acceptable level so that staff cannot increase noise levels.
- The bell system should be set so that it only occurs on school days.

5 ROAD TRAFFIC NOISE GENERATION

This section of the report considers the potential noise impacts from additional traffic generated on the surrounding local road network as a result of the proposed development.

At the time of this assessment, there was limited information on the proposed location of vehicle drop-off locations around the site. Access to the site's two carparks will be via Waratah Street and Mary Street.

5.1 Traffic Noise Criteria - NSW Road Noise Policy (2011)

Additional guidance for the assessment of traffic noise generated on public roads by new developments is set out in the EPA's Road Noise Policy 2011 (RNP).

The RNP provides base line criteria for noise impacts on residences affected by additional traffic on public roads generated by land use developments. These criteria are found in Table 3 of the RNP and is reproduced in Table 5-1 with the relevant criteria applicable to the site highlighted.

Table 5-1 Road Traffic Noise Assessment Criteria for Residential Land Uses (RNP)

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day (7 a.m.–10 p.m.)	Night (10 p.m.–7 a.m.)
Freeway/ arterial/ sub-arterial roads	1. Existing residences affected by noise from **new** freeway/arterial/sub-arterial road corridors	$L_{Aeq, (15\ hour)}$ 55 (external)	$L_{Aeq, (9\ hour)}$ 50 (external)
	2. Existing residences affected by noise from **redevelopment** of existing freeway/arterial/sub-arterial roads	$L_{Aeq, (15\ hour)}$ 60 (external)	$L_{Aeq, (9\ hour)}$ 55 (external)
	3. Existing residences affected by **additional traffic** on existing freeways/arterial/sub-arterial roads generated by land use developments		
Local roads	4. Existing residences affected by noise from **new** local road corridors	$L_{Aeq, (1\ hour)}$ 55 (external)	$L_{Aeq, (1\ hour)}$ 50 (external)
	5. Existing residences affected by noise from **redevelopment** of existing local roads		
	6. Existing residences affected by **additional traffic** on existing local roads generated by land use developments		

Given that the criteria in Table 5-1 only relates to existing residences, only the residential receivers to the east of the site (R1 along Wharf Road) will be considered in this assessment.

For the purposes of this assessment, Wharf Road will be classified as a sub-arterial road. This is based on the functional role definition for sub-arterial roads provided in Table 2 of the RNP where it states that sub-arterial roads "*provide connection between arterial roads and local roads*". We note that Wharf Road connects to Victoria Road to the north of the site, which would be considered an arterial road.

Where the cumulative noise impact from existing traffic and traffic generated by the development exceed the relevant base line criteria stipulated in Table 5-1, additional analysis should be conducted to evaluate whether

traffic noise levels at residences would increase by more than 2dB. If the increase in overall traffic noise levels is less than the RNP's 2dB "allowance" criterion, this would typically be considered as a barely perceptible increase in noise level and is unlikely to result in any adverse impacts on residential receivers. We note that we have assessed traffic noise generation from the proposed development against the RNP's "allowance" criterion in section 5.2 below.

5.2 Traffic Noise Generation Assessment

Estimates of projected peak hour traffic volumes have been provided by the traffic consultant advising on the project. This assessment will predict traffic noise generation on public roads as a result of the proposed school redevelopment.

Figures 3.11 and 3.12 of the *Melrose Park Transport Management and Accessibility Plan* (MPTMAP) prepared by Jacobs, dated 24 January 2019 outline the approximate existing peak hour traffic volume ranges on Wharf Road to the east of the site. These are presented in Table 5-2.

Table 5-2 MPTMAP Approximate Existing Peak Hourly Traffic Volumes

Road	Approximate Existing Peak Hour Traffic Volumes	
	AM	PM
Wharf Road	250 – 750	1,022 – 1,272

The traffic consultant has indicatively predicted that the proposed school redevelopment will generate up to 150 additional vehicle trips, and that approximately 60 of these additional vehicle trips will occur along Wharf Road. Based on this, the total peak hour traffic volume ranges on Wharf Road (combined volumes from existing traffic and additional traffic from the redevelopment) are summarised in Table 5-3.

Table 5-3 Predicted Peak Hourly Traffic Volumes with Proposed Redevelopment

Road	Approximate Peak Hour Traffic Volumes	
	AM	PM
Wharf Road	310 – 810	1,082 – 1,332

Based on the additional traffic generation on Wharf Road from the proposed redevelopment, increases in traffic noise levels at the R1 residences to the east of the site are predicted to increase by approximately 1dB at most. This complies with the RNP's 2dB "allowance" criteria and so it can be reasonably concluded that additional traffic noise generated from the site is unlikely to result in any adverse impacts on the existing surrounding residential receivers.

6 EXTERNAL NOISE INTRUSION ASSESSMENT

6.1 Acoustic Criteria

Internal noise criteria have been adopted from the Australian Standard AS/NZS 2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors.* The criteria are summarised in Table 6-1.

Table 6-1 External Noise Intrusion Criteria for Educational Institutions

Occupancy Type	Recommended Design Level ($L_{Aeq,cont.}$ dBA)
Assembly Halls up to 250 seats	30 – 40
Assembly halls over 250 seats	30 – 35
Libraries – General Area	40 – 50
Libraries – Reading Area	40 – 45
Office Areas	40 – 45
Professional and Administrative Spaces	35 - 40
Teaching Spaces – Primary Schools	35 – 45
Staff common rooms	40 – 45

6.2 Analysis

Based on the L_{Aeq} traffic noise levels measured as part of the on-site noise survey (presented in Table 3-2), calculations were performed to determine the internal noise levels within the proposed development as a result of noise transmission through the building façade elements (glazing, external walls and roof/ceiling). This analysis considered the transmission loss performance of the façade elements, the surface area of each façade element exposed to external noise, and the expected absorption characteristics of the internal spaces due to room finishes.

6.3 Recommendations

6.3.1 External Glazing

We recommend that all external window glazing and glazed doors achieve a minimum R_w 31 performance. This can typically be achieved with 6.38mm laminated glass in heavy duty frames with full perimeter acoustic seals (eg Q-Lon seals – felt/brush weather seals are unsuitable).

The R_w performance of the glazing/glazed door systems should be verified by an acoustic certificate/testing report to the satisfaction of the acoustic consultant. The R_w performance of the glazing assembly is to be representative of the combined performance of the glazing and glazing frame.

These glazing recommendations should be reviewed at detailed design stage.

6.3.2 External Walls

Masonry or concrete external walls will provide adequate acoustic isolation and are not expected to require any additional acoustic treatment to meet the internal noise requirements.

Any lightweight external walls constructions should be reviewed to confirm that they will adequately mitigate external noise intrusion.

Any penetrations in the external walls (e.g. for mechanical ventilation) should be appropriately acoustically treated so that they do not compromise the acoustic integrity of the wall.

6.3.3 Roof/Ceiling

Standard roof/ceiling constructions are expected to be suitable for controlling external noise intrusion from traffic noise.

7 CONSTRUCTION NOISE & VIBRATION IMPACT ASSESSMENT

7.1 Proposed Construction Hours

Where possible, works should be completed during the standard daytime construction hours of Monday to Friday 7.00am to 6.00pm and Saturday 8.00am to 1.00pm. Where Out-of-Hours Works (OOHWs) are required (for emergency works/delivery, etc) it is likely that they would require separate approval.

7.2 Noise Management Levels – Interim Construction Noise Guideline (EPA, 2009)

The NSW EPA *Interim Construction Noise Guideline (ICNG)* requires project-specific Noise Management Levels (NMLs) to be established for noise affected receivers. In the event construction noise levels are predicted to be above the NMLs, all feasible and reasonable work practices are investigated to minimise noise emissions.

Having investigated all feasible and reasonable work practices, if construction noise levels are still predicted to exceed the NMLs then the potential noise impacts would be managed via site specific construction noise management plans, to be prepared in the detailed design phase. **Table 7-1** detail the *ICNG* noise management levels.

Table 7-1 Interim Construction Noise Guideline Criteria at Residences

Time of Day	NML	How to Apply
Standard Hours	Noise Affected RBL+10 dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly Noise Affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences; 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Time of Day	NML	How to Apply
Outside Standard Hours	Noise Affected RBL+5 dBA	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the *ICNG*.

The ICNG also recommends a NML of 45dBA $L_{Aeq,15min}$ for internal areas of classrooms (refer to Table 3 of the ICNG). This NML will be considered for the purposes of assessing potential construction noise impacts on the classrooms of the temporary school, which will be in use during construction. A corresponding external NML of 65 dBA $L_{Aeq,15min}$ will be adopted for classrooms based on the assumption that classrooms are expected to close their windows when construction activities are being undertaken, and that the outdoor to indoor noise reduction achieved through a closed window is 20dBA.

Based on the above, **Table 7-2** presents the applicable noise management levels for construction activities at surrounding receivers that have been adopted for all applications.

It is assumed that construction of the proposed redevelopment will be completed before the future residential development to the south (R2) and west (R3) are occupied. Based on this, receivers R2 and R3 will be assessed as commercial and industrial receivers consistent with their current use.

Table 7-2 Site-Specific Construction Noise Management Levels

Receiver Type	Construction Noise Management Level (NMLs) - $L_{Aeq,15min}$				Highly Noise Affected Noise Level – $L_{Aeq,15min}$
	Day Standard Hours	Day OOH	Evening OOH	Night OOH	
Residential Receivers[1]	54	49	43	39	75
Commercial	70				
Industrial	75				
Classroom Receivers within Temporary School (External)	65				

Note 1: Based on the background noise levels measured at Location LT3 (refer to Table 3-2), which is representative of the noise environment at the Wharf Road residential receivers.

7.3 Vibration Management Levels

When assessing vibration there are two components that require consideration:

- human exposure to vibration; and
- the potential for building or structure damage from vibration

There are currently no Australian Standards or guidelines to provide guidance on assessing the potential for building damage from vibration. It is common practice to derive goal levels from international standards.

British Standard BS 7385:1993 and German Standard DIN 4150:2016 both provide vibration criteria, below which vibration is considered insufficient to cause building damage. Of these, DIN 4150 is the more stringent.

7.3.1 Construction Noise & Vibration Strategy (TfNSW, 2023)

In order to limit the risk of vibration based damage, minimum working distances for typical vibration intensive construction equipment are provided in the Transport for NSW's (TfNSW) *Construction Noise and Vibration Strategy (CNVS)*. The minimum working distances presented in Appendix D of the *CNVS* are based on the vibration criteria for cosmetic damage to structures given in British Standard BS 7358-2-1993 - *Evaluation and measurement for vibration in buildings – Part 2 for typical buildings*, and for effects to human comfort (from the NSW EPA *Assessing Vibration – A Technical Guideline*).

Empirical data has been used to suggest screening distances at which if vibration intensive works are conducted outside these distances, adverse vibration impacts are unlikely.

The recommended minimum working distances for vibration intensive activities from the CNVS are presented in **Table 7-3**. The empirical data has also been extrapolated to provide screening distances as concerns DIN 4150-3 criteria.

Table 7-3 Recommended Minimum Working Distances from Vibration Intensive Equipment

Plant Item	Approx. Size / Weight / Model	Minimum Distance		
		Cosmetic Damage (BS 7385)	Cosmetic Damage (DIN 4150-3)	Human Response (NSW EPA Guideline)
Vibratory Roller	1-2 tonnes	5 m	14 m	15 m to 20 m
	2-4 tonnes	6 m	16 m	20 m
	4-6 tonnes	12 m	33 m	40 m
	7-13 tonnes	15 m	41 m	100 m
	13-18 tonnes	20 m	54 m	100 m
	> 18 tonnes	25 m	68 m	100 m
Small Hydraulic Hammer	300 kg (5t to 12t excavator)	2 m	5 m	7 m
Medium Hydraulic Hammer	900 kg (12t to 18t excavator)	7 m	19 m	23 m

Plant Item	Approx. Size / Weight / Model	Minimum Distance		
		Cosmetic Damage (BS 7385)	Cosmetic Damage (DIN 4150-3)	Human Response (NSW EPA Guideline)
Large Hydraulic Hammer	1600 kg (18 to 34t excavator)	22 m	60 m	73 m
Pile Driver – Vibratory	Sheet Piles	2 m to 20 m	50 m	20 m
Piling Rig – Bored	≤ 800 mm	2 m (nominal)	5 m	4 m
Piling Rig – Hammer	12 t down force	15 m	2 m	50 m
Jackhammer	Handheld	1 m (nominal)	14 m	Avoid contact with structure

7.4 Construction Noise Assessment

Noise modelling of the construction noise emissions was undertaken using the CadnaA version 2025 modelling software.

The noise model was constructed from a combination of aerial photography, existing ground topography, design ground topography and proposed design. The local terrain, receiver buildings and structures have been digitised in the noise model to develop a three-dimensional representation of the construction works and surrounding environment.

7.4.1 Proposed Works

At this stage, a detailed list of the construction plant proposed to be used during the construction project was not provided. Notwithstanding, a preliminary assessment has been undertaken of the construction activities that are anticipated to occur as part of the proposed redevelopment.

This construction noise and vibration assessment has broken the construction works into the following three categories in-principle:

- Demolition and clearing works
- Excavation and piling
- Building construction

Sound power levels (SWLs) for the typical operation of construction equipment applied in the modelling are listed in Table 7-4 and have been based on measurements conducted by RWDI and Appendix C of the CNVS. To assess construction noise levels against the NMLs, the noise levels have been converted to equivalent $L_{Aeq,15min}$ noise emissions based on the expected period of operation of the individual pieces of construction plant.

Table 7-4 Construction Noise Sources

Activity	Equipment	Operating minutes in 15-min period	Quantity	Sound Power Level (dB)		
				Individual Item (SWL)	$L_{Aeq,15min}$ Activity	Total $L_{Aeq,15min}$ Activity
Demolition and Clearing of Existing School Buildings	Excavator (30 t)	15	2	110	**113**	115
	Truck & Dog (30 t)	15	2	108	**111**	
Excavation and Piling	Dozer (D10)	10	1	116	**114**	119
	Truck & Dog (30 t)	15	2	108	**111**	
	Excavator (30 t)	15	2	110	**113**	
	Piling Rig	5	1	116	**111**	
	Concrete Truck	15	1	109	**109**	
Construction of Buildings	Concrete Truck / Agitator	15	2	106	**109**	117
	Concrete Pump	15	1	109	**109**	
	Truck (20 t)	15	2	103	**106**	
	Mobile Crane	10	2	113	**114**	
	Hand Tools	7.5	4	105	**108**	
	Elevated Work Platform	10	2	97	**98**	

Consistent with the requirements of the *ICNG*, and to inform the scheduling of construction activity and management of noise during the detailed design phase, the construction noise impacts are based on an expected typical worst-case scenario. The *ICNG* recommends that the realistic worst-case or conservative noise levels from the source should be predicted for assessment locations representing the most noise exposed residences or other sensitive land uses. For each receiver area the noise levels are predicted at the most noise-exposed location, which would usually be the closest receiver.

For most construction activities, it is expected that the construction noise levels would frequently be lower than predicted at the most-exposed receiver as the noise levels presented in this report are based on an expected worst-case assessment.

7.4.2 Predicted Construction Noise Levels

Preliminary noise levels from construction activities have been quantitatively assessed for the receivers surrounding the Site. The activities considered are described in Section 7.4.1.

The typical expected worst case $L_{Aeq,15min}$ noise levels at the surrounding receivers are provided in **Table 7-5**. Each of the construction activities are representative of the 'noisiest' construction periods where there may be simultaneous operation of several noise intensive construction plant on site. It is anticipated that construction will occur during standard hours only.

Noise impacts on receivers R2 and R3 will be assessed against the more stringent NML for commercial receivers (70dBA), noting that these receivers have a mix of commercial and industrial uses.

Table 7-5 Predicted Construction Noise Impacts

Activity	Receiver	Noise Level – $L_{Aeq,15min}$ dBA					
		Predicted Noise Level at Nearest Receivers	Noise Affected Noise Management Levels (NMLs)				Highly Noise Affected NML
			Day Standard	Day OOH	Eve OOH	Night OOH	
Demolition and Clearing of Existing School Buildings	R1 (Residential)	60 – 71	54	49	43	39	75
	R2 Commercial and Industrial	60 – 72	70				
	R3 Commercial and Industrial	56 - 65	70				
	I4 Industrial	60 - 82	75				
	School Classrooms	60 - 77	65				
Excavation and Piling	R1 (Residential)	59 – 75	54	49	43	39	75
	R2 Commercial and Industrial	63 – 75	70				
	R3 Commercial and Industrial	61 – 75	70				
	I4 Industrial	65 – 82	75				
	School Classrooms	66 - 84	65				
Construction of Buildings	R1 (Residential)	58 – 74	54	49	43	39	75
	R2 Commercial and Industrial	60 – 75	70				
	R3 Commercial and Industrial	59 – 73	70				
	I4	64 – 77	75				

Activity	Receiver	Noise Level – $L_{Aeq,15min}$ dBA					
		Predicted Noise Level at Nearest Receivers	Noise Affected Noise Management Levels (NMLs)				Highly Noise Affected NML
			Day Standard	Day OOH	Eve OOH	Night OOH	
	Industrial						
	School Classrooms	64 - 82	65				

The results of the assessment can be summarised as follows:

- Excavation and piling works are predicted to result in exceedances of the daytime noise-affected NMLs at the residential receivers along Wharf Road by up to 21 dB.
- Excavation and piling works are predicted to result in exceedances of the NMLs for the classrooms within the temporary school by up to 19 dB.
- Excavation and piling works are predicted to result in exceedances of the noise-affected NMLs by up to 5dB at the R2 and R3 commercial receivers.
- Demolition activities are predicted to result in exceedances of the daytime noise-affected NMLs at the residential receivers along Wharf Road by up to 17 dB.
- Demolition activities are predicted to result in exceedances of the NMLs for the classrooms within the temporary school by up to 12 dB.
- Construction activities are predicted to result in exceedances of the NMLs for the classrooms within the temporary school by up to 17 dB.
- No exceedances to the highly noise affected NML are predicted at any of the residential receivers.
- Demolition, and excavation and piling works are predicted to result in exceedances of the noise-affected NMLs by up to 7dB at the I4 industrial receivers to the north of the site.

The above conclusions apply to an expected worst-case scenario for construction noise generation from the site in which works occur in the regions of the site in closest proximity to the receivers. Measures to manage construction noise emissions are discussed in Section 7.4.3.

7.4.3 Construction Noise Mitigation

As discussed in Section 7.4.2, noise levels from construction activities during standard hours may exceed the NMLs of the *ICNG* at the nearest receivers in the vicinity of the site. Therefore, in accordance with the *ICNG*, all reasonable and feasible measures should be applied to manage construction noise emissions from the site. In particular, the following is recommended:

A detailed Construction Noise and Vibration Management Plan (CNVMP) should be prepared and should include, but not be limited to the following:

- Identification of nearby residences and other sensitive land uses;
- Description of approved hours of work;
- Description and identification of construction activities, including work areas, equipment and duration;
- Description of what work practices (generic and specific) will be applied to minimise noise;

- Consider the selection of plant and processes with reduced noise emissions;
- A complaints handling process;
- Noise monitoring procedures;
- Overview of community consultation required for identified high impact works;
- Overview of community consultation process and assessment required for identified additional works outside of standard construction hours; and
- Induction and training will be provided to relevant staff and sub- contractors outlining their responsibilities regarding to noise.

Examples of typical construction noise mitigation measures are provided in **Table 7-6**, along with the likely reduction in noise levels. Where reasonable and feasible, these measures should be employed during the construction of the development.

Table 7-6 Indicative Construction Noise Mitigation Measures

Mitigation Measure	Anticipated Noise Reduction, dBA
Administrative Controls	
Operate during approved hours	N/A
Undertake regular noise monitoring to determine the impact of operating plant on sensitive receivers	N/A
Appropriate training of onsite staff	N/A
Undertake community consultation and respond to complaints in accordance with established project procedures	N/A
Turning off machinery when not in use	0-5
Respite periods for pile drivers and rock breakers (if applicable)	N/A
Conducting regular maintenance of plant to ensure that they are operating as efficiently and quietly as practicable	N/A
Engineering Controls	
Portable temporary screens	5-10
Screen or enclosure for stationary equipment	10-15
Maximising the offset distance between noisy plant items and sensitive receivers	3-6
Avoiding using noisy plant simultaneously and / or close together, adjacent to sensitive receivers	2-3
Orienting equipment away from sensitive receivers	3-5
Carrying out loading and unloading away from sensitive receivers	3-5
Using dampened tips on rock breakers	3-6
Using noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including bulldozers, cranes, graders, excavators and trucks	5-10
Selecting site access points and roads as far as reasonably practicable away from sensitive receivers	3-6
Using spotters, closed circuit television monitors, “smart” reversing alarms, or “squawker” type reversing alarms in place of traditional reversing alarms	2-5
Employ non-noise-generating structures such as site offices, storage sheds, stockpiles, and tanks as noise barriers	5-10

7.5 Construction Vibration Assessment – Building Damage & Human Comfort

Should there be use of vibration intensive plant used within the minimum recommended distances of the CNVS of a sensitive receiver (refer to Table 7-3), or if there are any other vibration intensive plant items that the Contractor has concerns for causing disruption at a neighbouring receiver, it is recommended that a preliminary vibration survey (typically attended vibration measurements) be undertaken of each vibration generating piece of plant.

This vibration survey will determine whether there will be any exceedances of the relevant construction vibration criteria. If exceedances are observed, vibration mitigation and management strategies can be developed to minimise vibration impacts as far as practicable, and ideally to be compliant with the vibration criteria.

The vibration management strategy may also include the installation of unattended vibration monitors at sensitive receivers to notify the contractor of any exceedances of the vibration criteria. Any such vibration management strategy should be developed as part of a CNVMP.

8 EVALUATION OF ENVIRONMENTAL IMPACTS

An assessment has been undertaken to predict the significance of noise and vibration impacts associated with the proposed redevelopment.

In terms of the operation of the development, the primary sources of noise and vibration generation are expected to be mechanical plant, vehicles movements within the site, school announcements and bells, and passive recreational noise from the outdoor play areas. The findings of our assessment are as follows:

- Noise emissions from mechanical plant are predicted to comply with the requirements of the NPfI provided that the recommendations presented in Section 4.2.4.1 are observed.
- Noise from vehicles manoeuvring on site is predicted to comply with the requirements of the NPfI.
- There are no policies in New South Wales governing noise emissions from children within play areas of school facilities. However, observance of the recommendations outlined in Section 4.2.4.2 will assist in reducing noise impacts from the use of the outdoor play areas on surrounding receivers.
- Recommendations have been provided in Section 4.2.4.3 to assist in minimising noise impacts from school announcements and bells at surrounding residences.

Traffic noise generated by the development on the surrounding public roadways has been assessed and is predicted to comply with the requirements of the NSW RNP.

External noise intrusion into the development has been assessed with reference to the internal noise recommendations of AS/NZS 2107:2016. Provide that the recommendations presented in Section 6.3 are observed, internal noise levels within the development are predicted to comply with the nominated criteria.

A preliminary assessment of construction noise and vibration impacts from the development has been undertaken and presented in Section 7. The assessment indicates that construction activities may result in exceedances of the ICNG NMLs at the nearest receivers, however no exceedances of the highly noise affected NML are predicted. Construction noise and vibration impacts will need to be managed using all reasonable and

feasible measures in accordance with the ICNG. Noise and vibration mitigation measures have been presented in Sections 7.4.3 and 7.5 respectively and should be reviewed as part of a Construction Noise and Vibration Management Plan.

9 CONCLUSION

This report has presented a noise and vibration impact assessment for the proposed Melrose Park Public School redevelopment located at 110 Wharf Road, Melrose Park. This report forms part of the Review of Environmental Factors (REF) submission for the proposed development.

Noise impacts associated with the mechanical services and carparks have been assessed with reference to the *NPfI*. The results of the noise assessment indicate that noise emissions from these noise sources are capable of complying with the relevant acoustic requirements through considered design, the implementation of appropriate acoustic treatments, and noise management controls. In addition, discussion of potential impacts of noise from children playing has been included, although there is no formalised regulatory structure governing compliance of this noise source.

Road traffic generation associated with the proposed development have been assessed in accordance with the NSW EPA's RNP in section 5. Traffic noise generation associated with the site is predicted to comply with the RNP criteria.

Indicative acoustic treatments for the façade of the building have been presented in section 6 to mitigate traffic noise intrusion into the development.

Noise and vibration impacts from the construction of the development have been assessed in-principle in section 7 of the report in accordance with the ICNG. Construction NMLs have been established for sensitive receivers based on the established RBL. A computer noise model has been developed to predict $L_{Aeq,15min}$ construction noise levels at sensitive receivers.

Construction noise levels have been predicted for a range of construction activities. The predicted $L_{Aeq,15min}$ construction noise levels are expected to exceed the established noise affected NMLs at numerous receivers in the vicinity of the site, however no exceedances of the highly noise affected NML are predicted. It is recommended that a CNVMP be developed for the site and that all reasonable and feasible measures be implemented to minimise construction noise and vibration impacts.

10 STATEMENT OF LIMITATIONS

This report entitled *Melrose Park Public School – Noise and Vibration Impact Assessment* was prepared by RWDI Australia Pty Ltd ("RWDI") for School Infrastructure NSW ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

APPENDIX A – MITIGATION MEASURES

Mitigation Number/Name	When is Mitigation Measure to be complied with	Mitigation Measure	Reason for Mitigation Measure
Mechanical Services	During Operation Stage	• Mechanical services can feasibly comply with the required criteria • Specific measures to be determined after final equipment selection and plantroom design	Noise Mitigation
Noise from Children	During Operation Stage	• Children in outdoor play areas are to be supervised by staff to manage any excessive noisy behaviour. • Regarding out of school hours childcare and vacation day care, outdoor play should not occur before 7am. • The school should maintain a complaints register.	Noise Mitigation
Noise School Announcements and Bells	During Operation Stage	• There are no formally required compliance criteria for this source of noise, the following advice is provided for management of this source of noise: • Speakers should be located and orientated to provide good coverage of the school areas whilst being directed away from residences. The coverage of the system should be subject of the detail design of the system. • The volume of the system should be adjusted on site so that announcements and bells are clearly audible on the school site without being excessive. • Once the appropriate level has been determined on site, the system should be limited to the acceptable level so that staff cannot increase noise levels. • The bell system should be set so that it only occurs on school days.	Noise Mitigation
Sleep Disturbance	During Operation Stage	• Operational noise sources occurring prior to 7am are predicted to comply with sleep disturbance criteria • No mitigation measures required	Noise Mitigation

Mitigation Number/Name	When is Mitigation Measure to be complied with	Mitigation Measure	Reason for Mitigation Measure
External Noise Ingress	During Operation Stage	• Glazing with a minimum Rw 31 performance (combined performance of the glass and the frame) are predicted to acceptably mitigate traffic noise ingress	Noise Mitigation
Construction Noise and Vibration	During Construction Stage	• Construction noise and vibration management plan should be prepared prior to commencement of construction works on site to determine all reasonable and feasible measures for minimising construction noise and vibration impacts on surrounding receivers and temporary school.	Noise and Vibration Mitigation

APPENDIX B – NOISE MONITORING DATA

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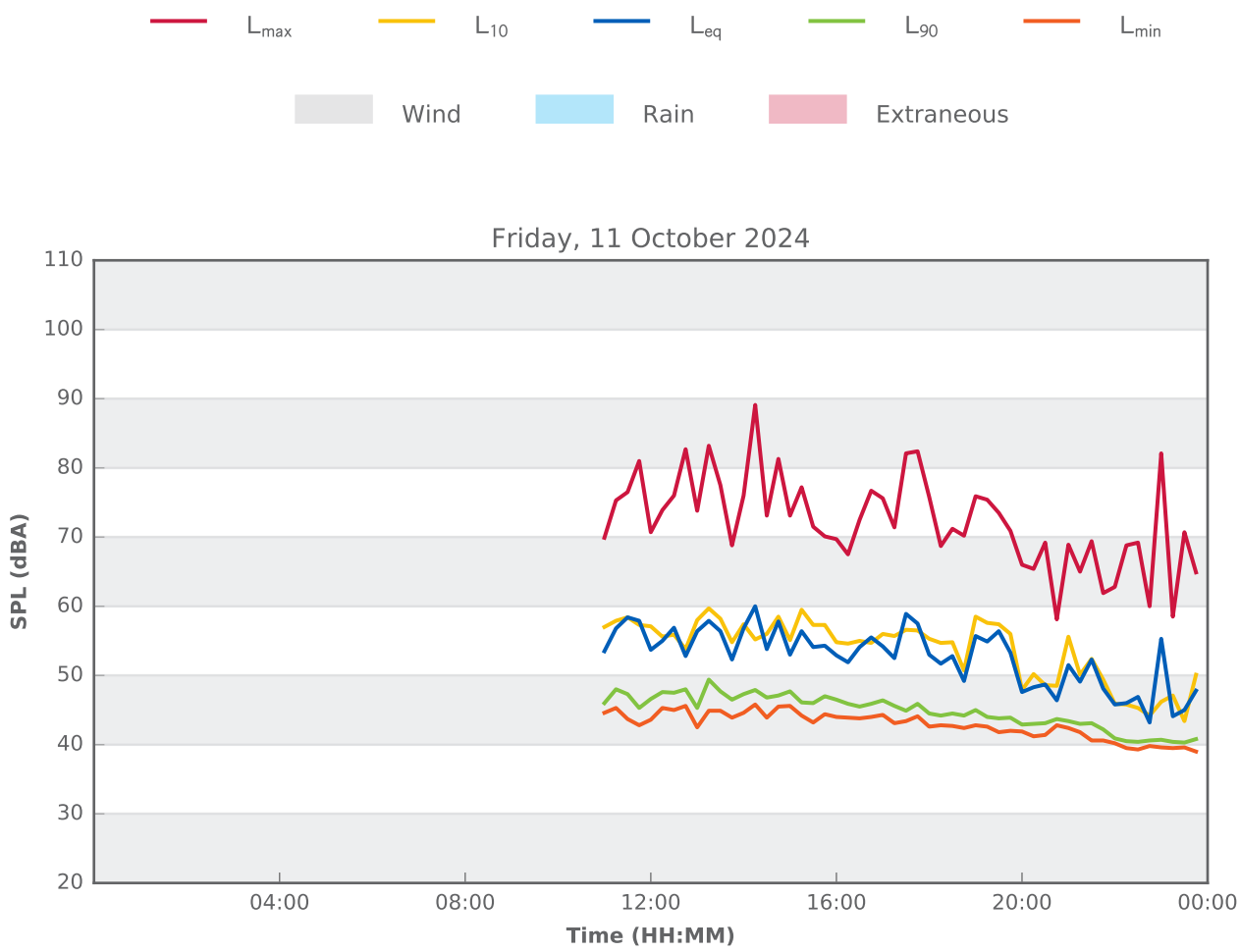

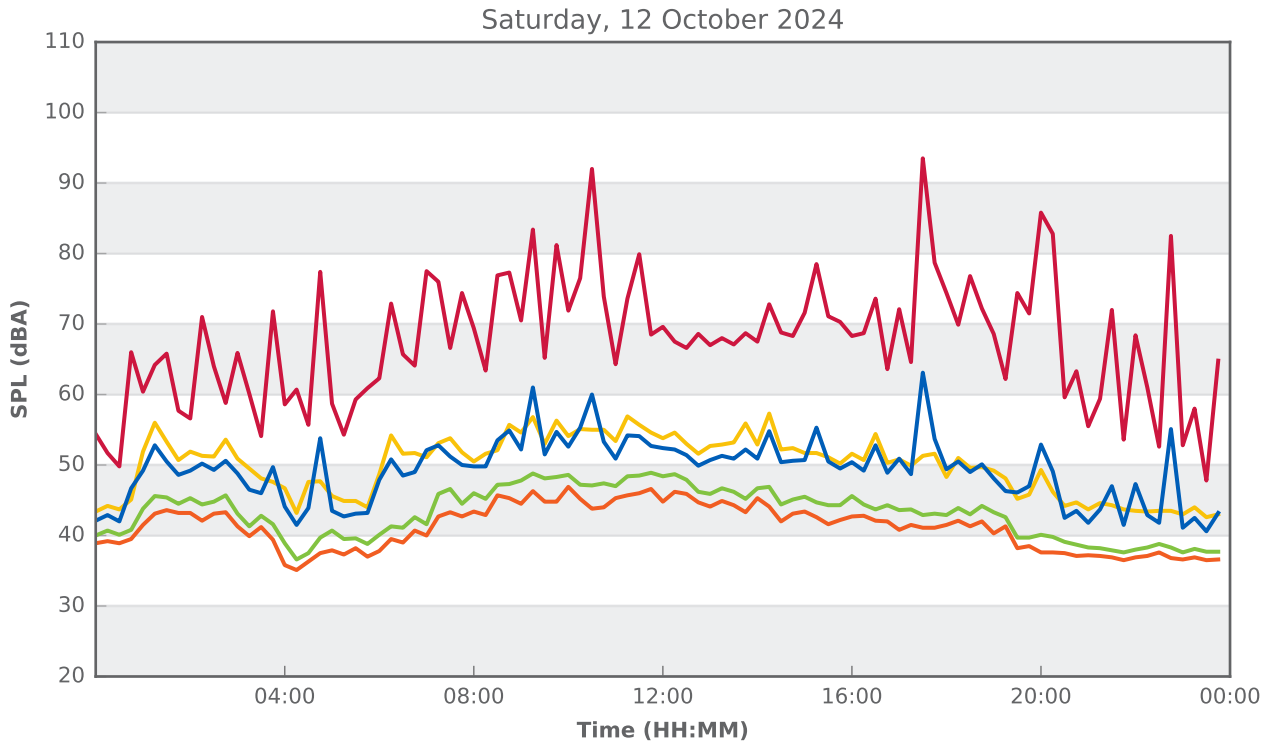

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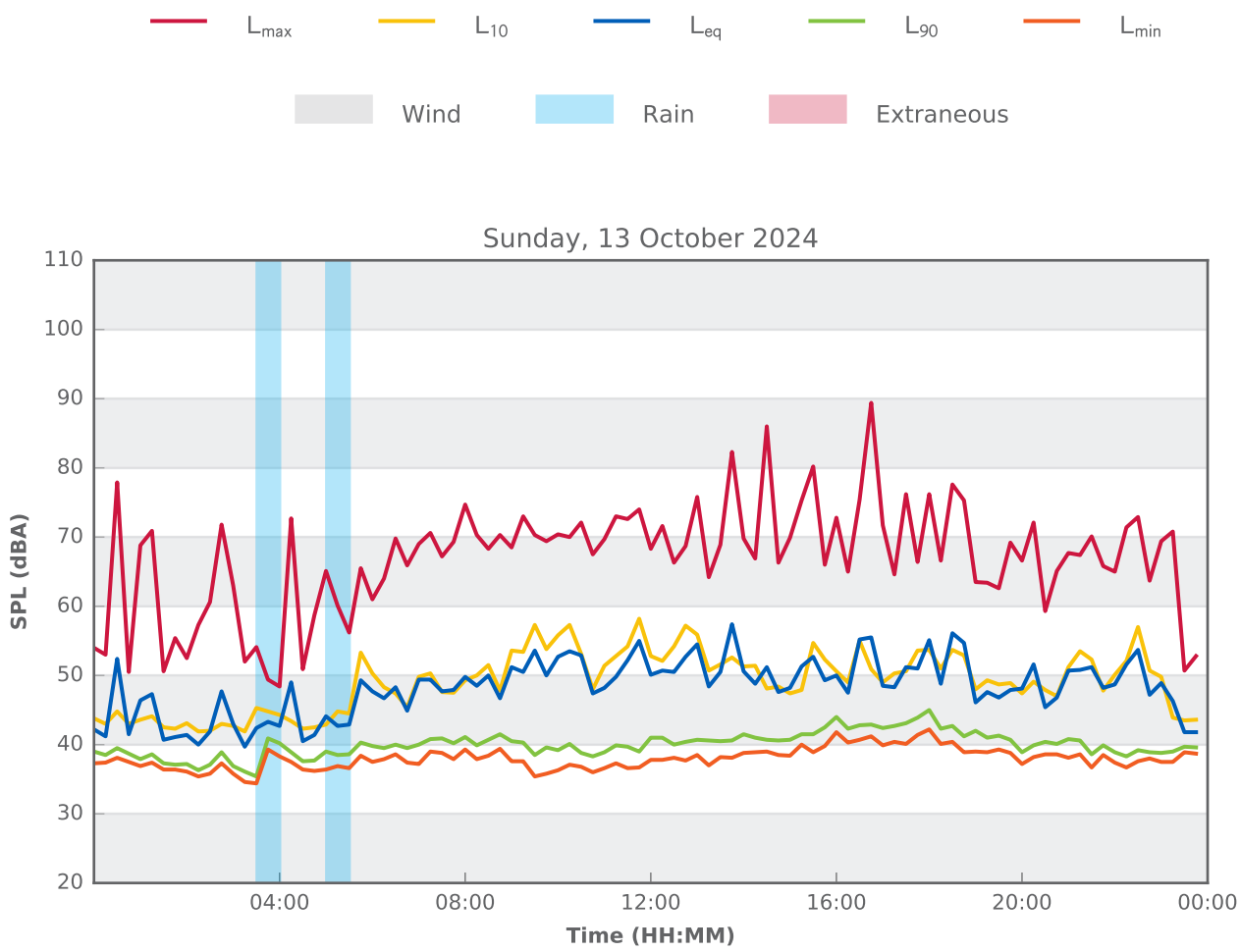

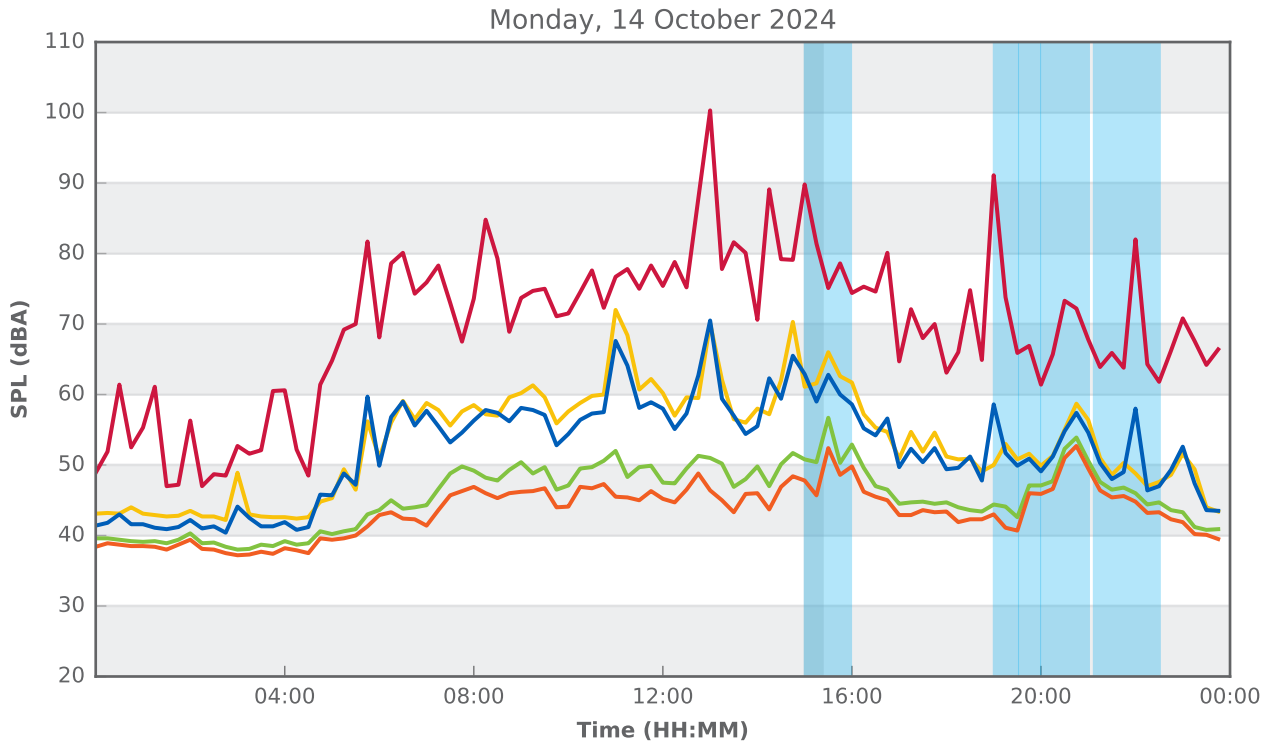

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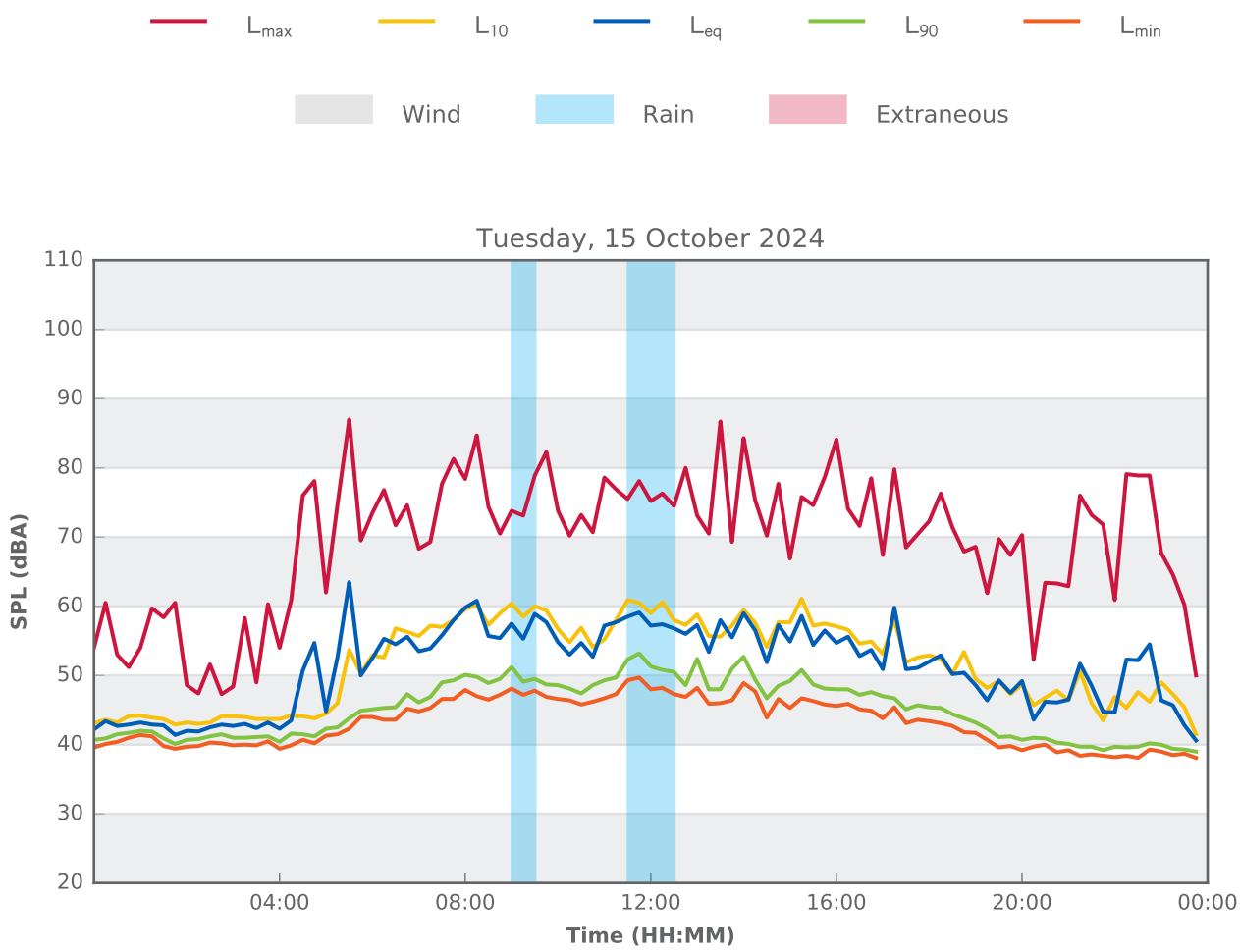

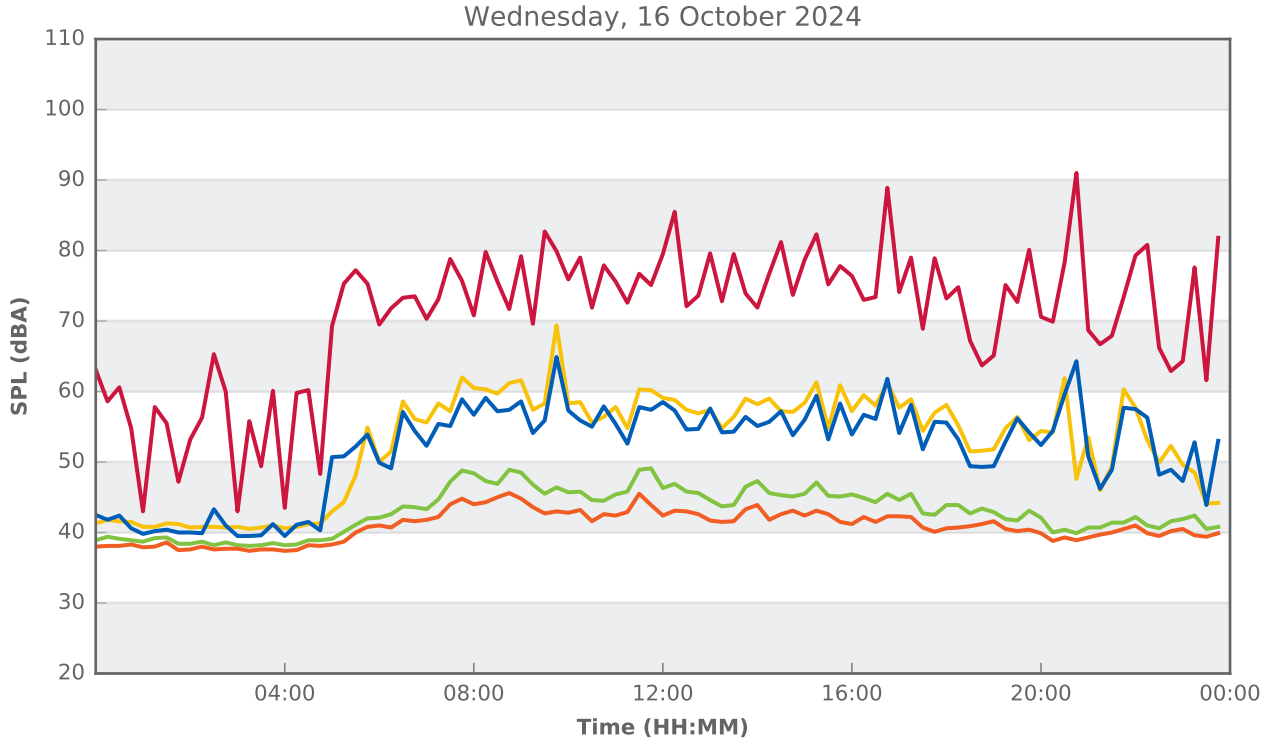

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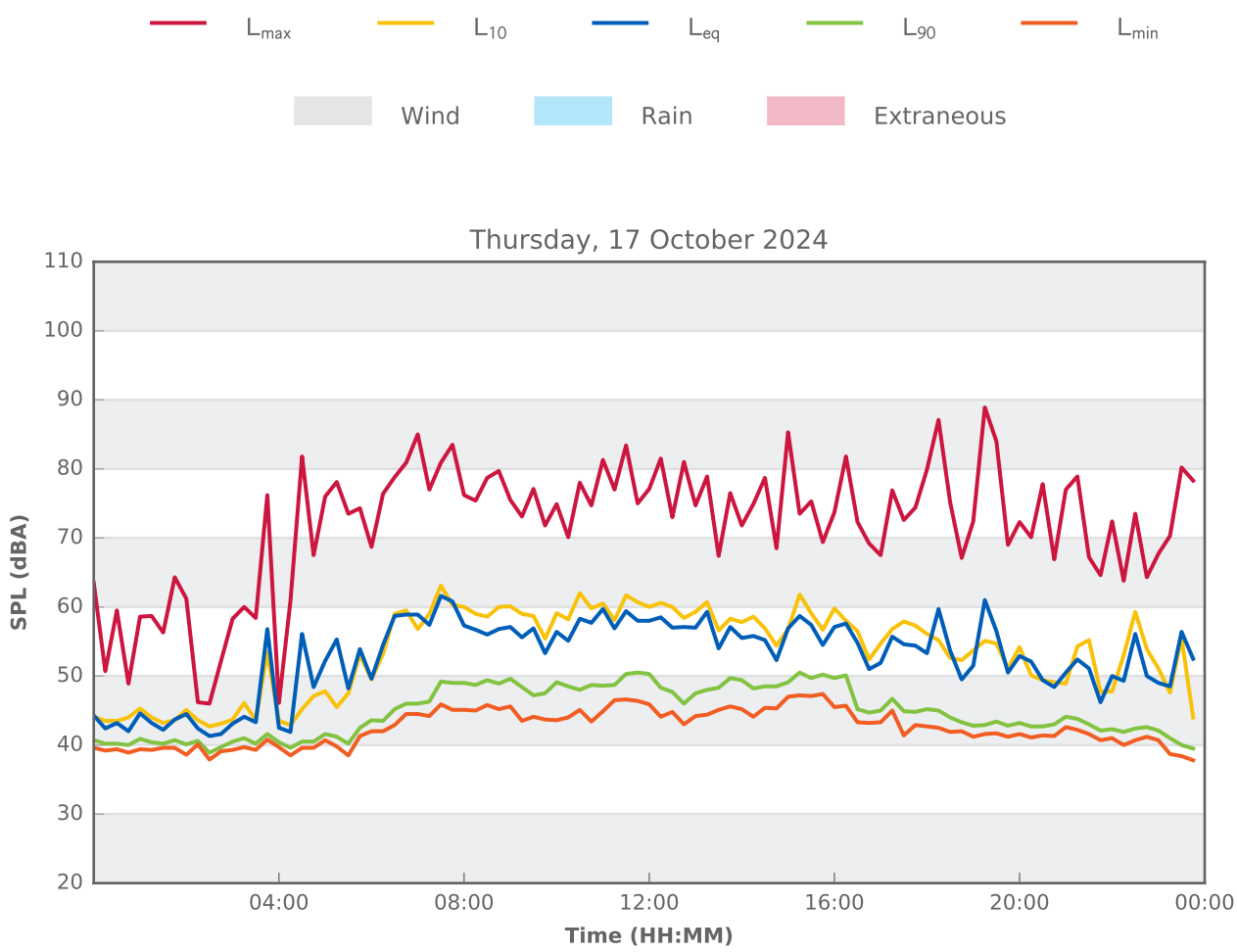

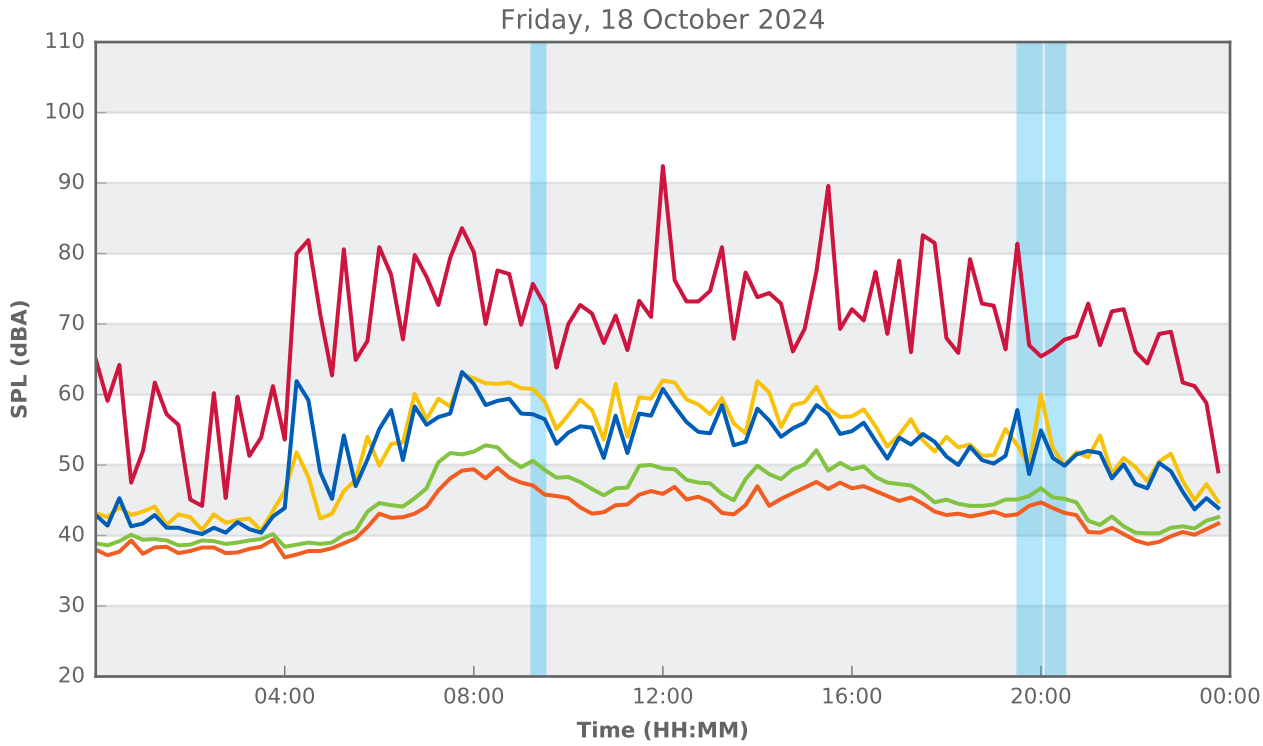

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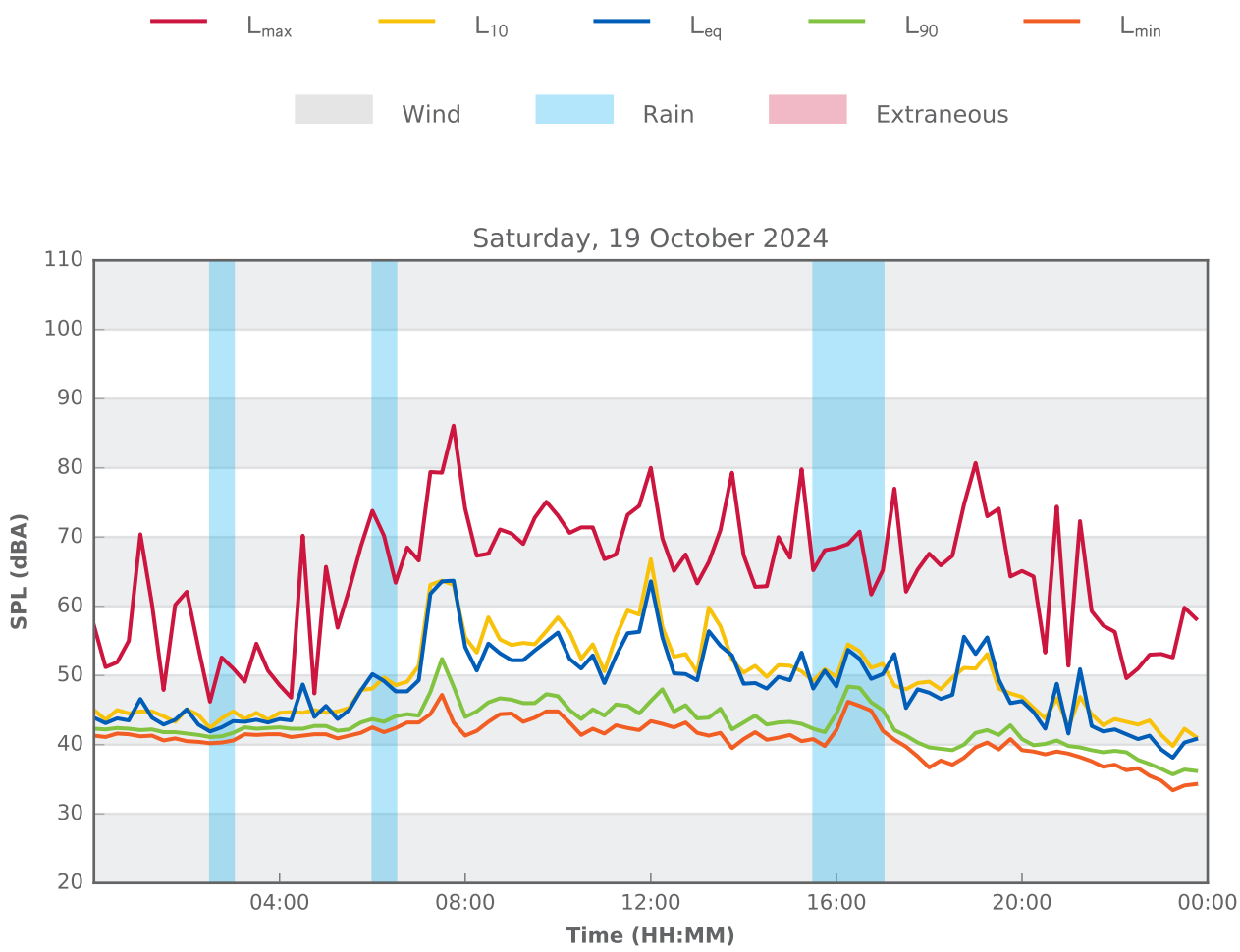

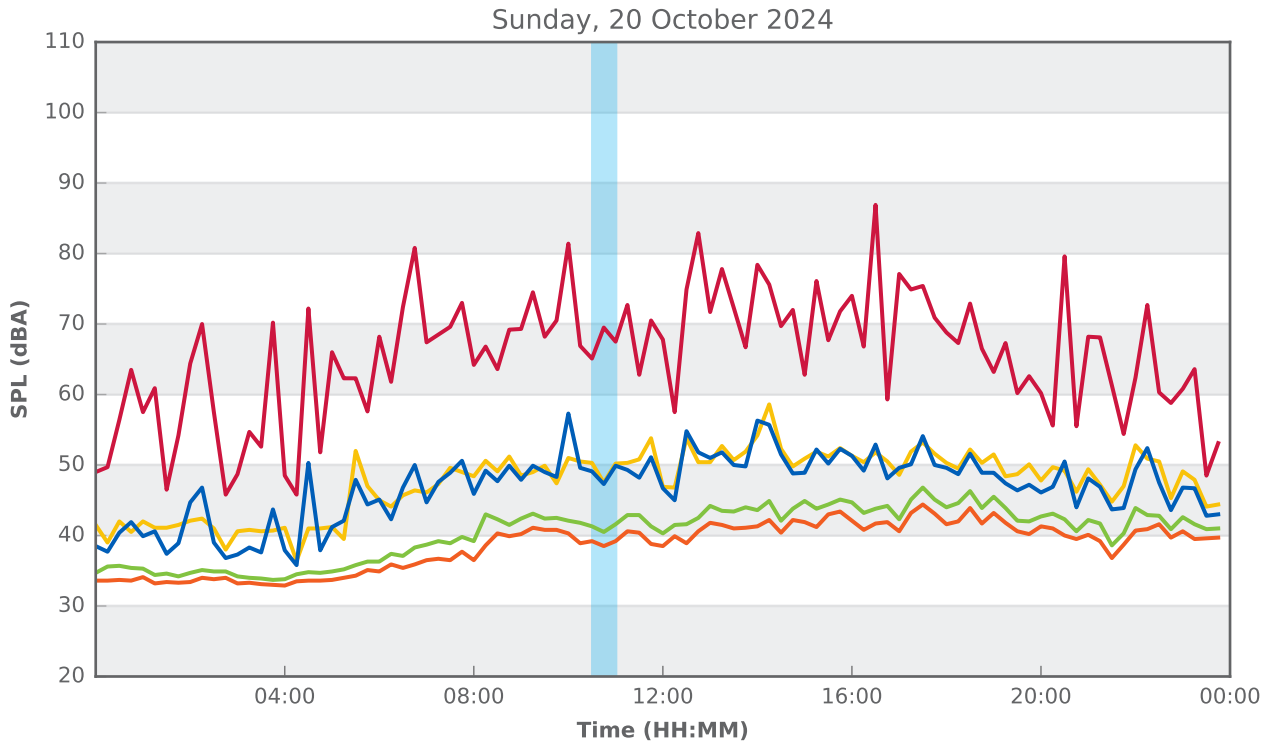

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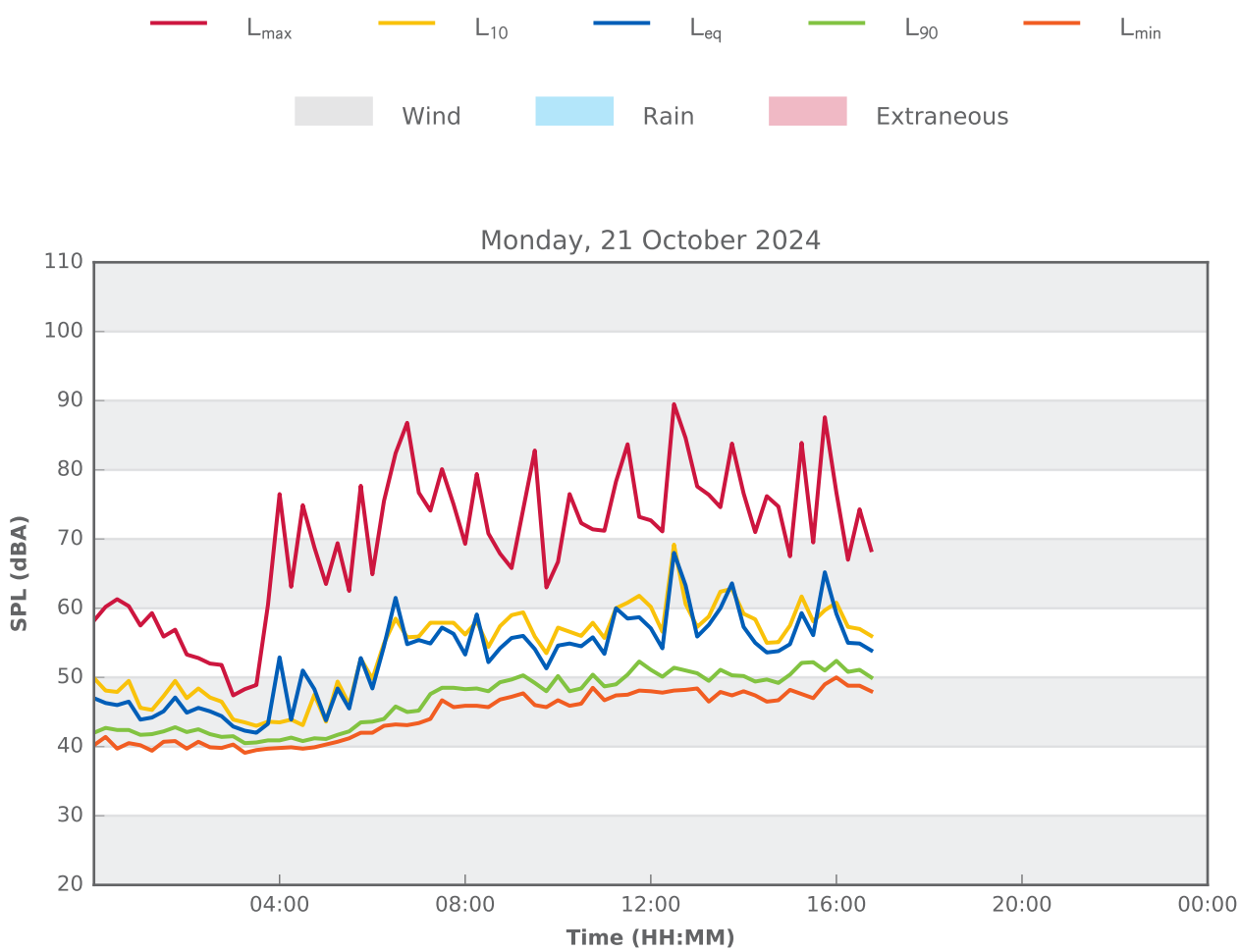

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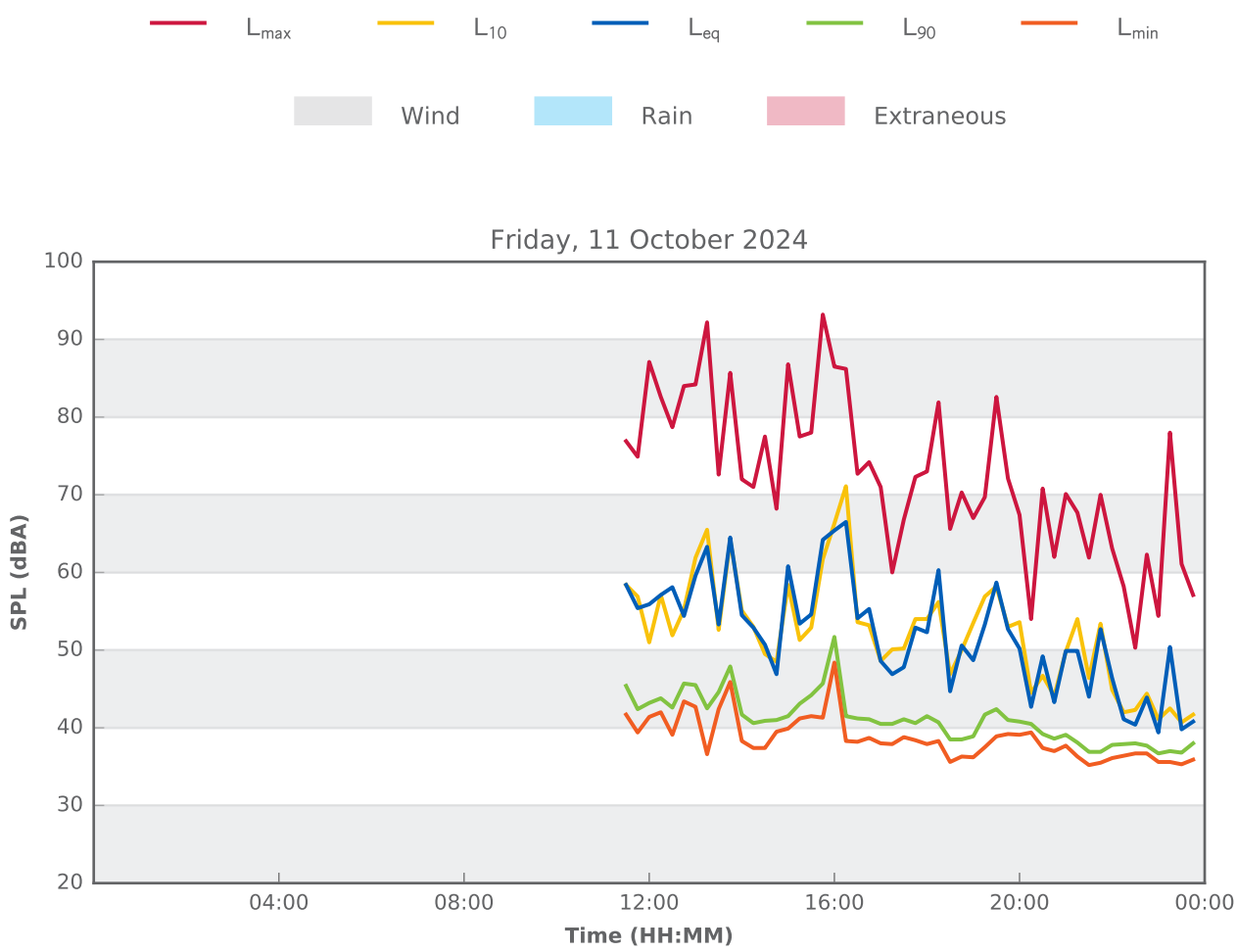

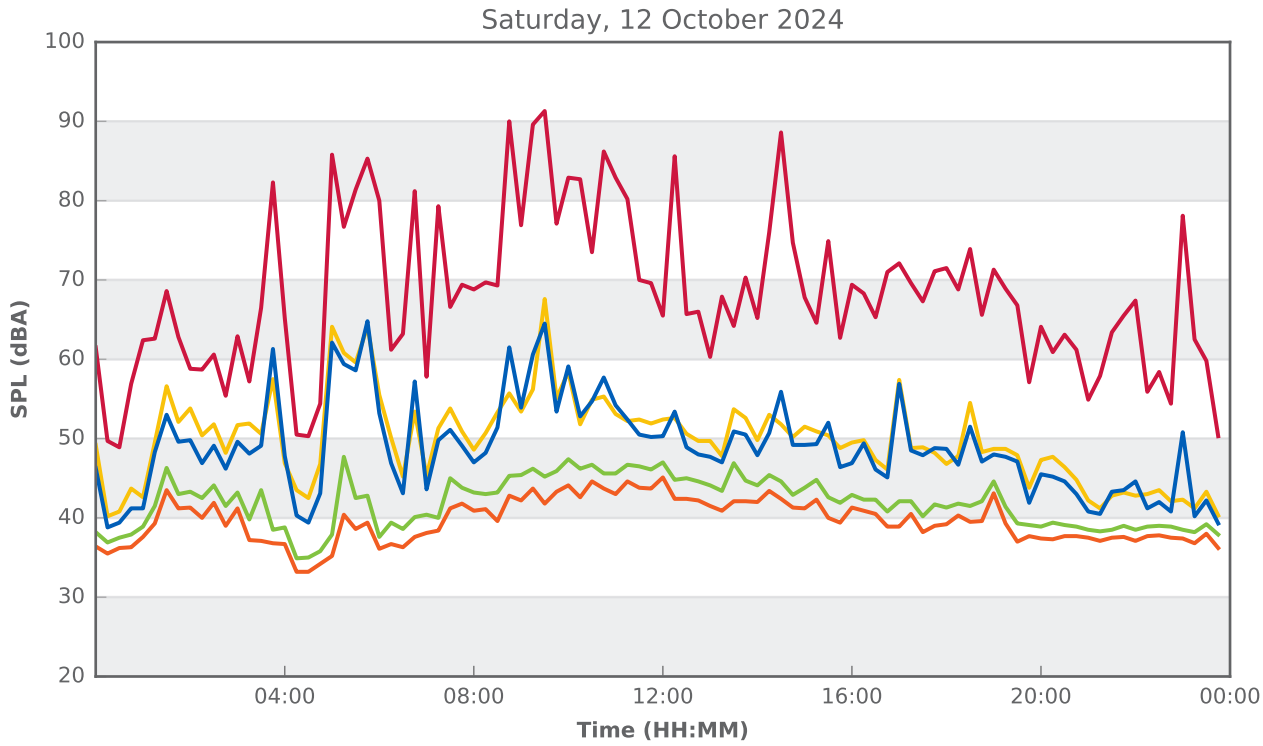

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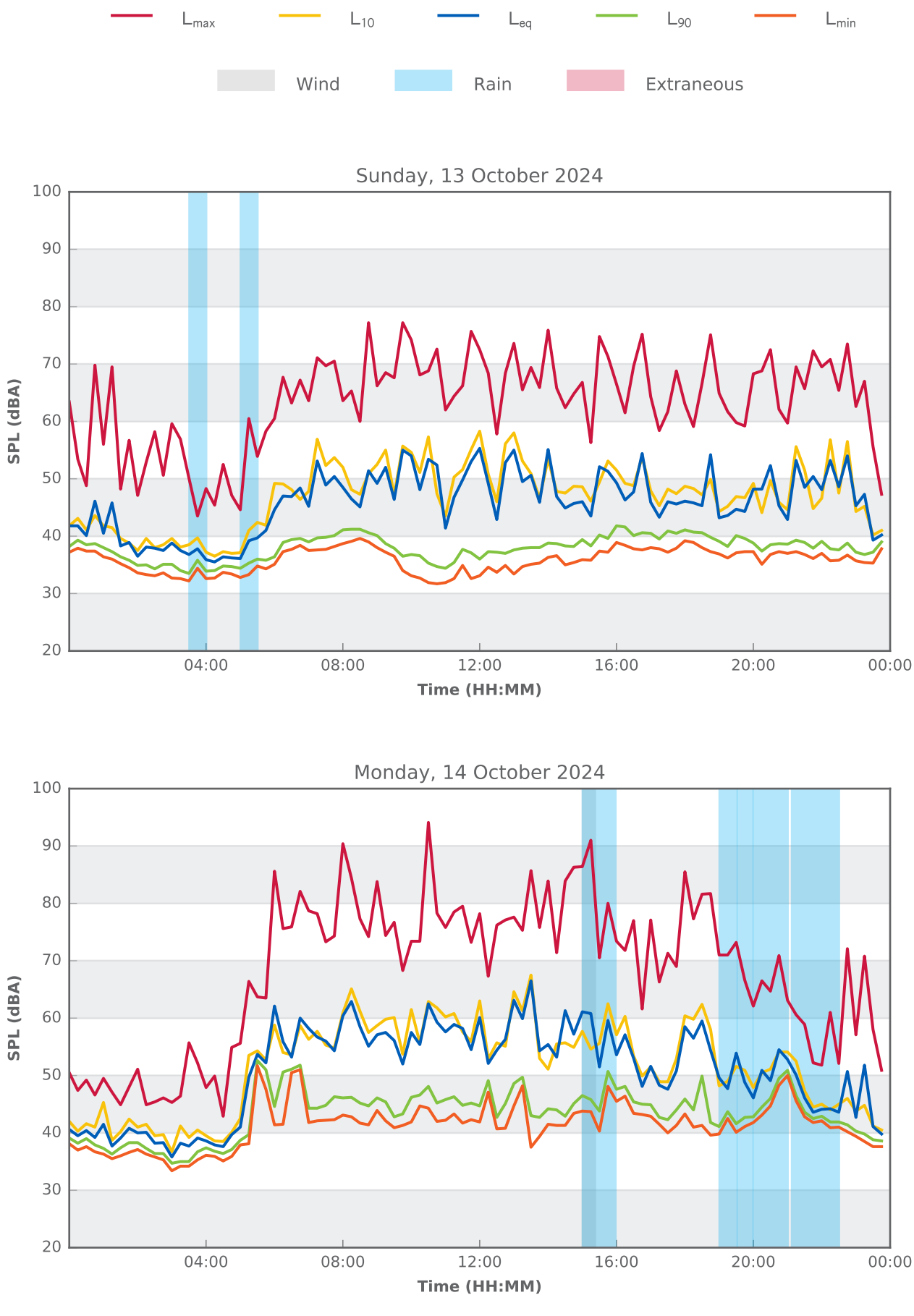

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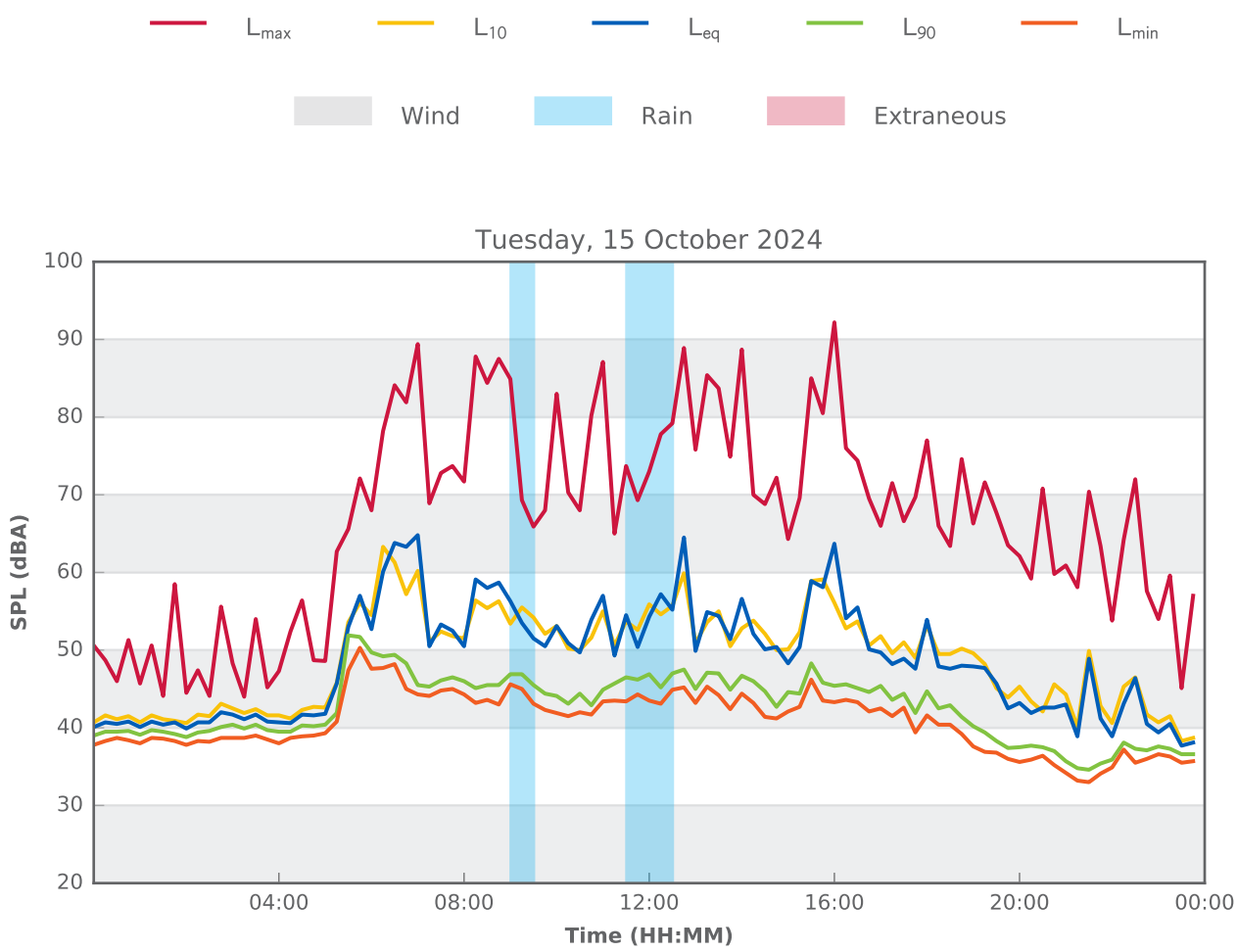

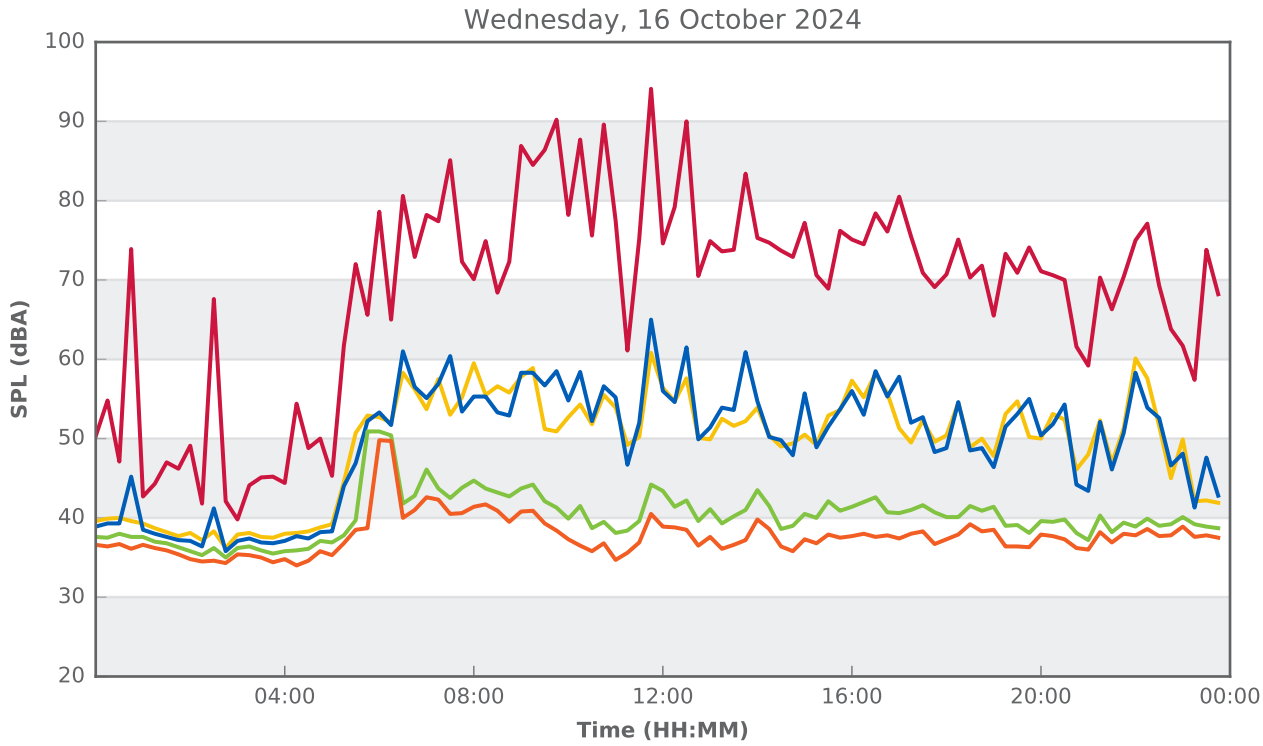

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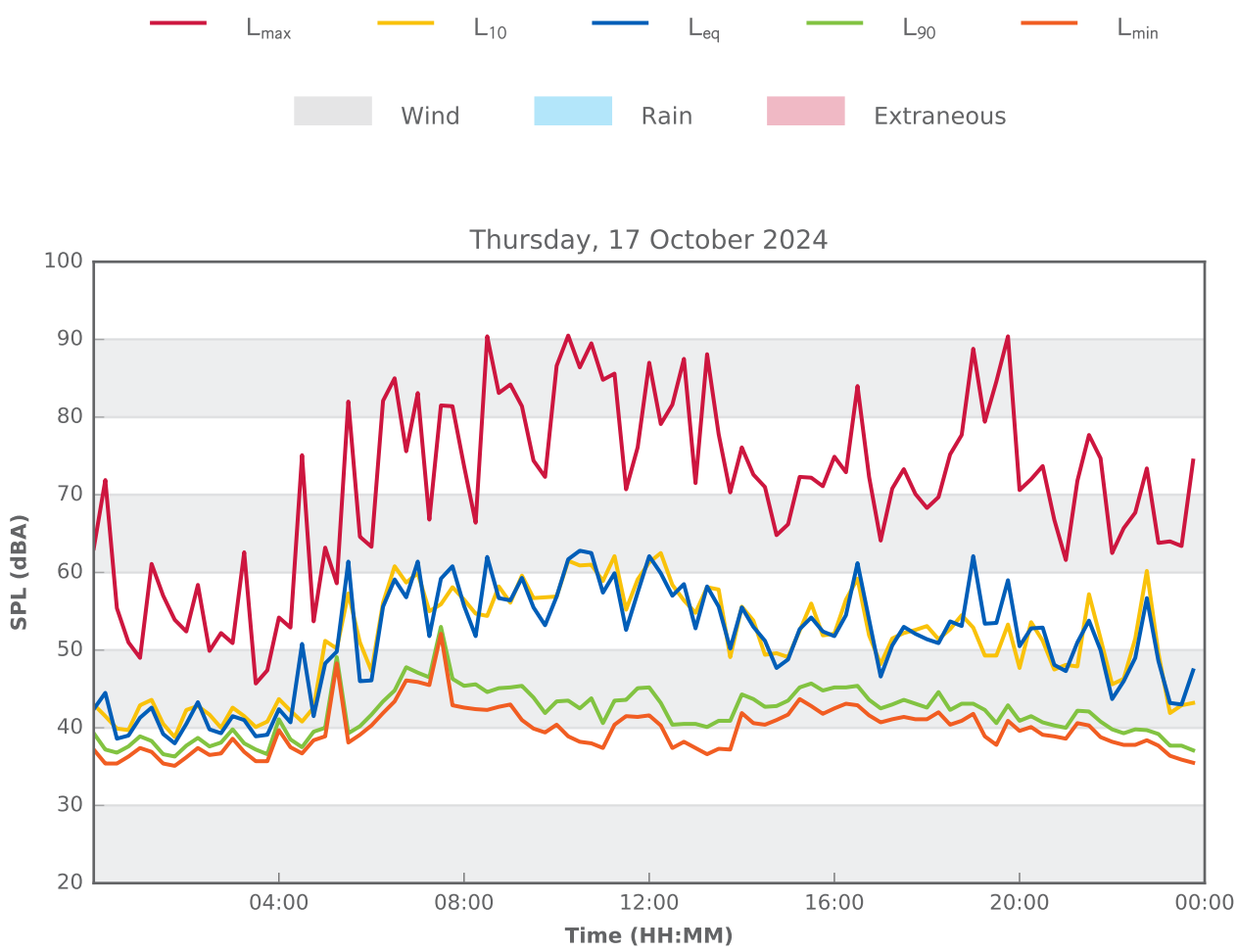

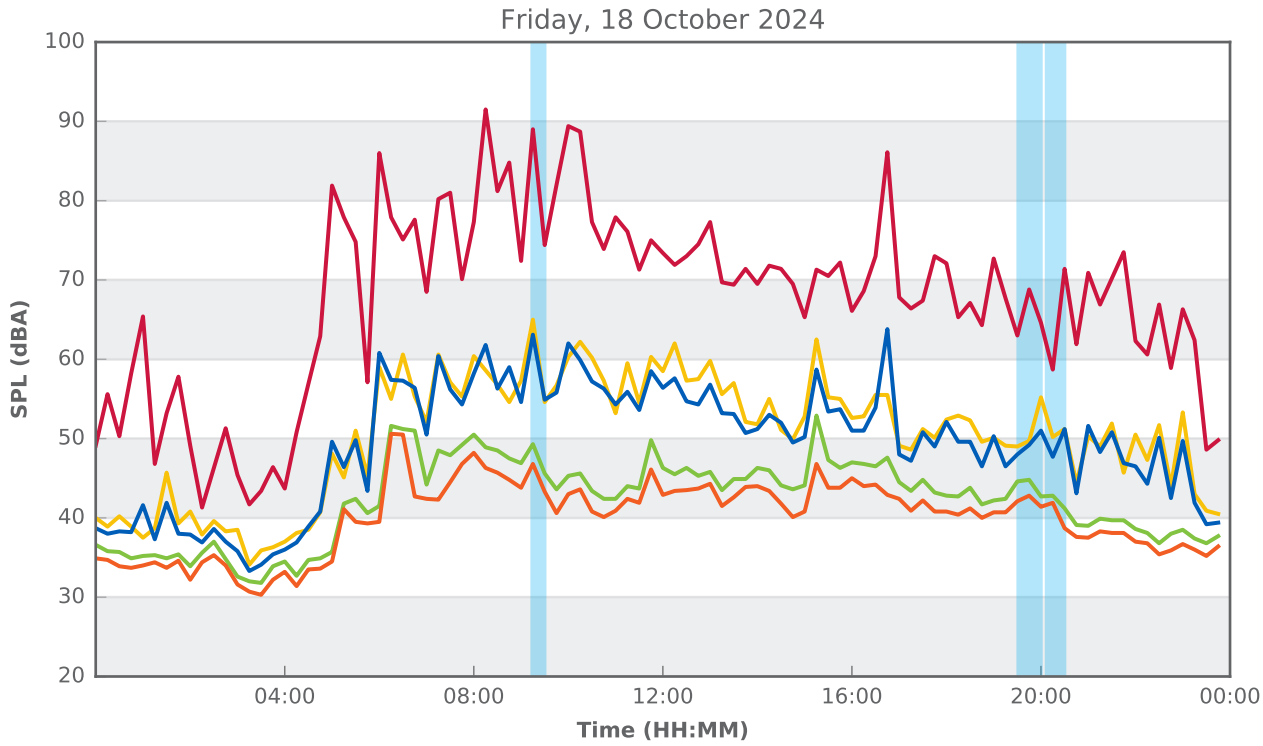

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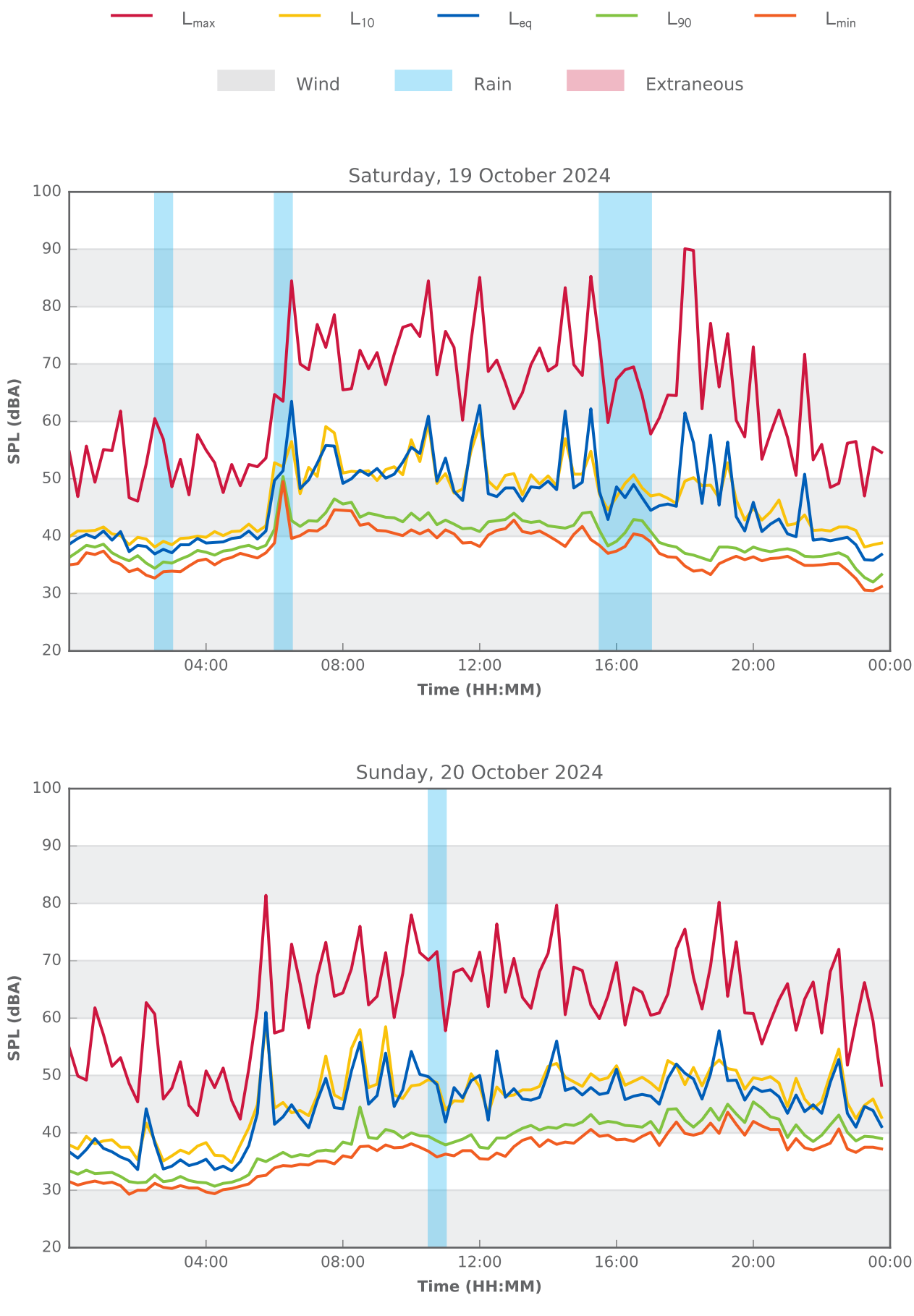

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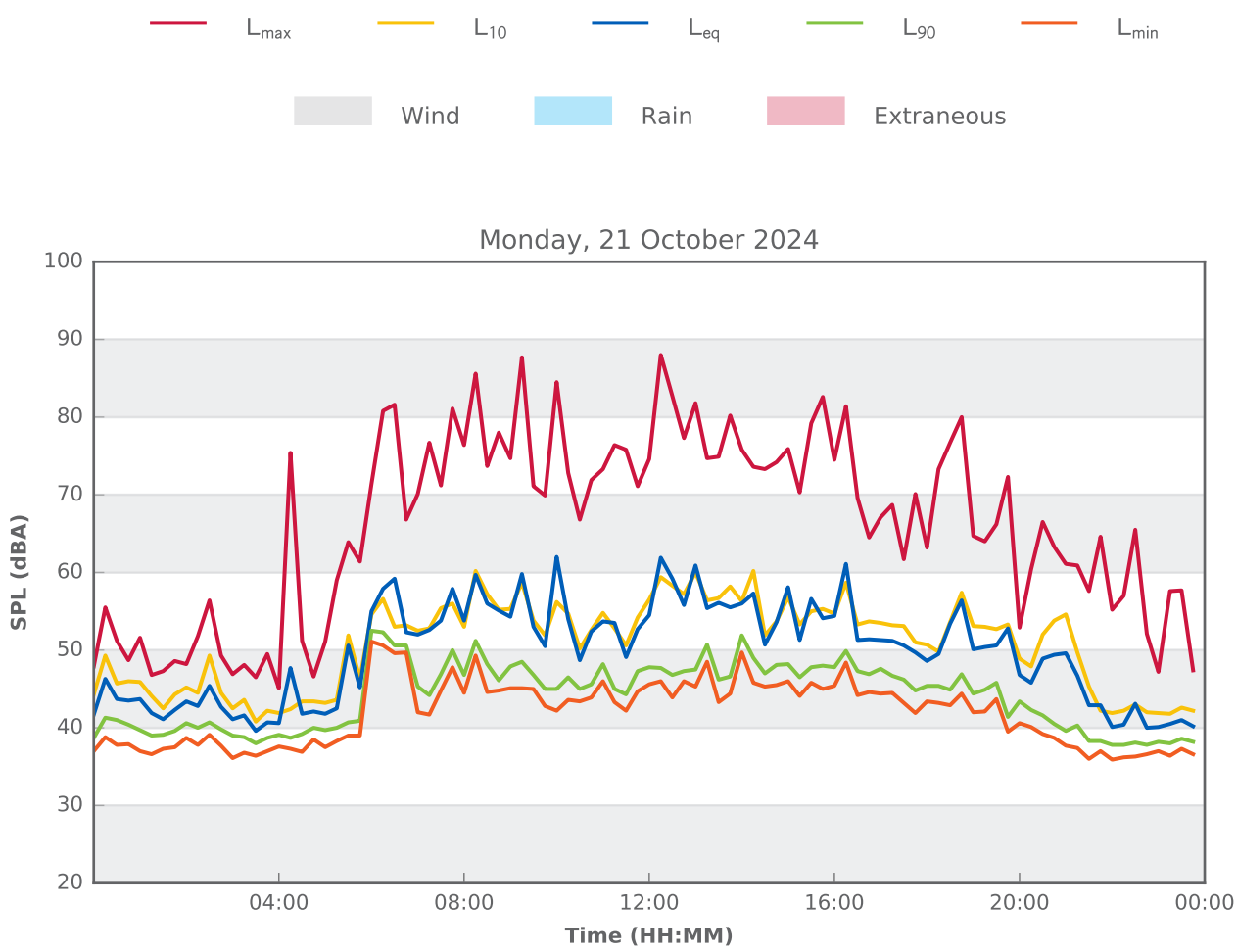

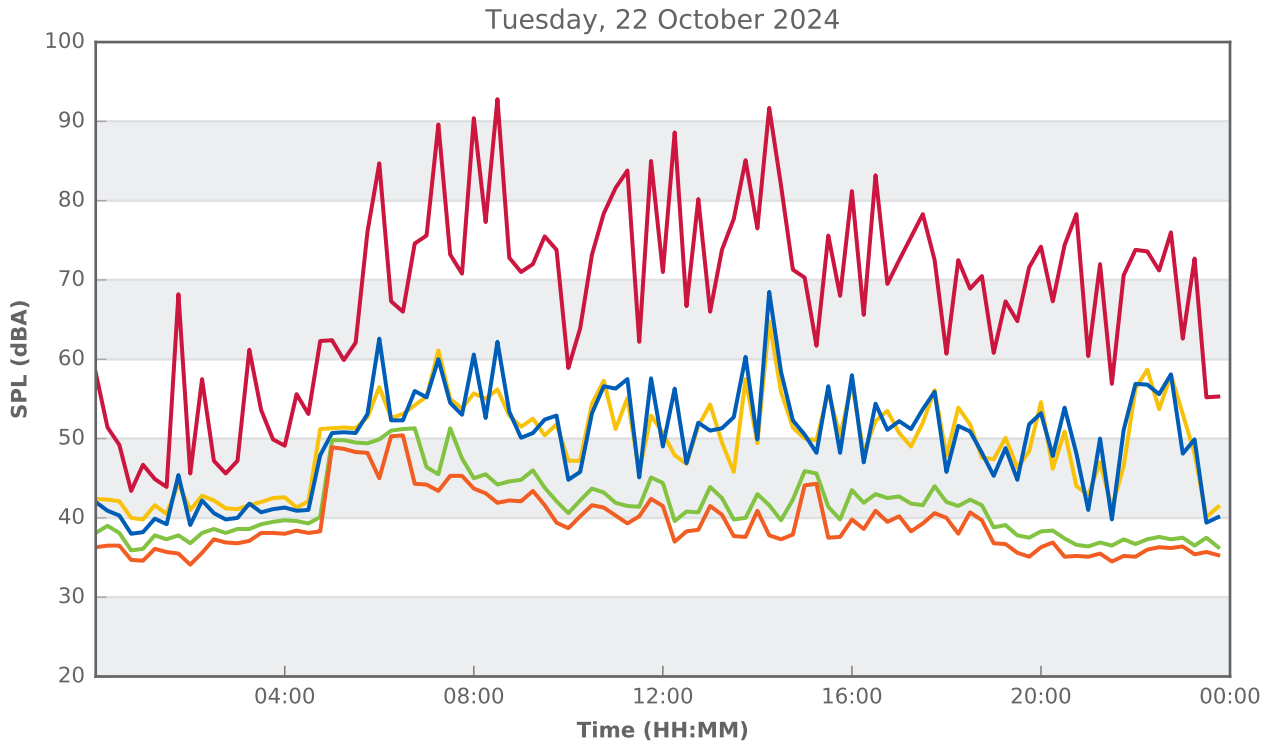

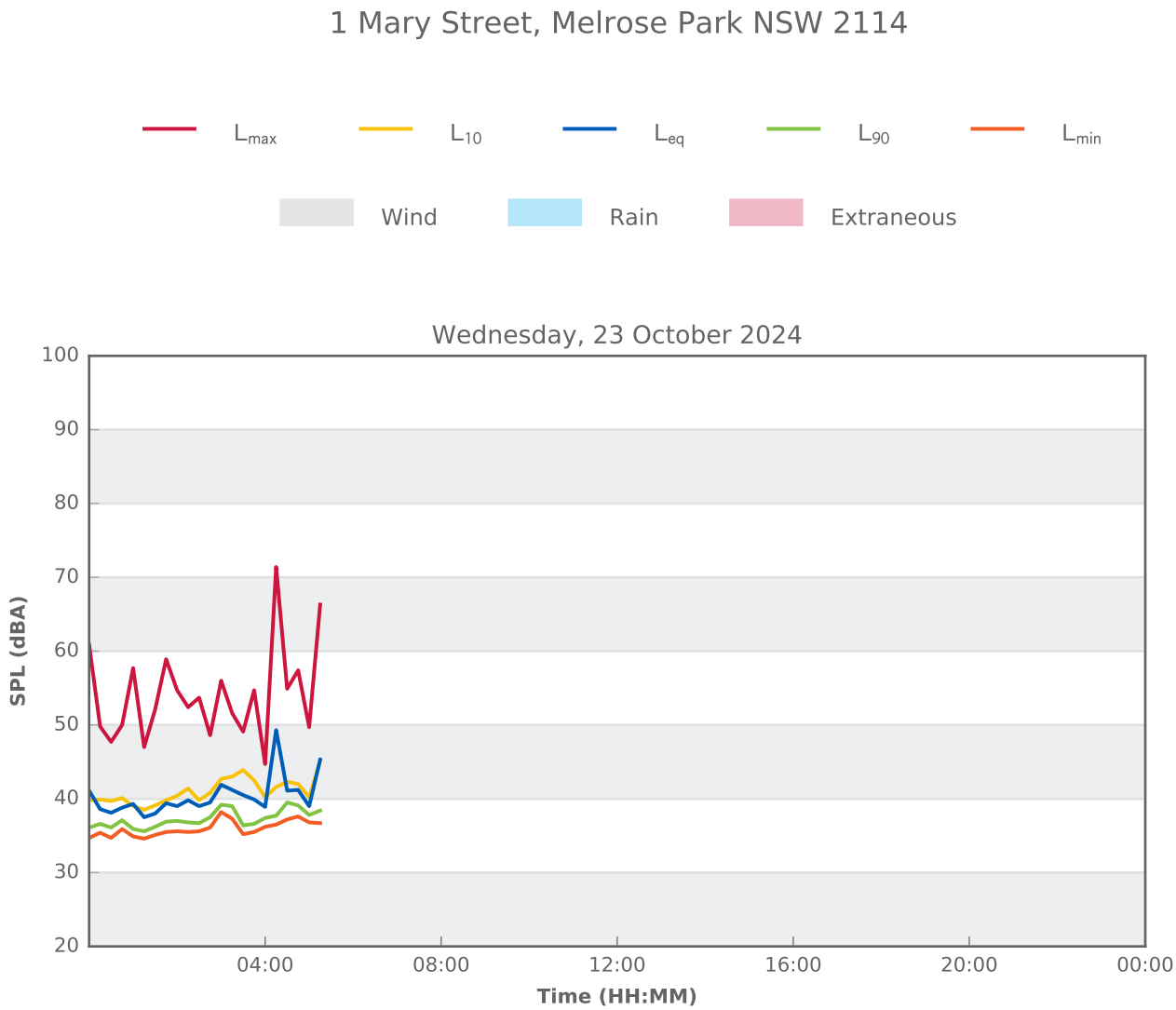
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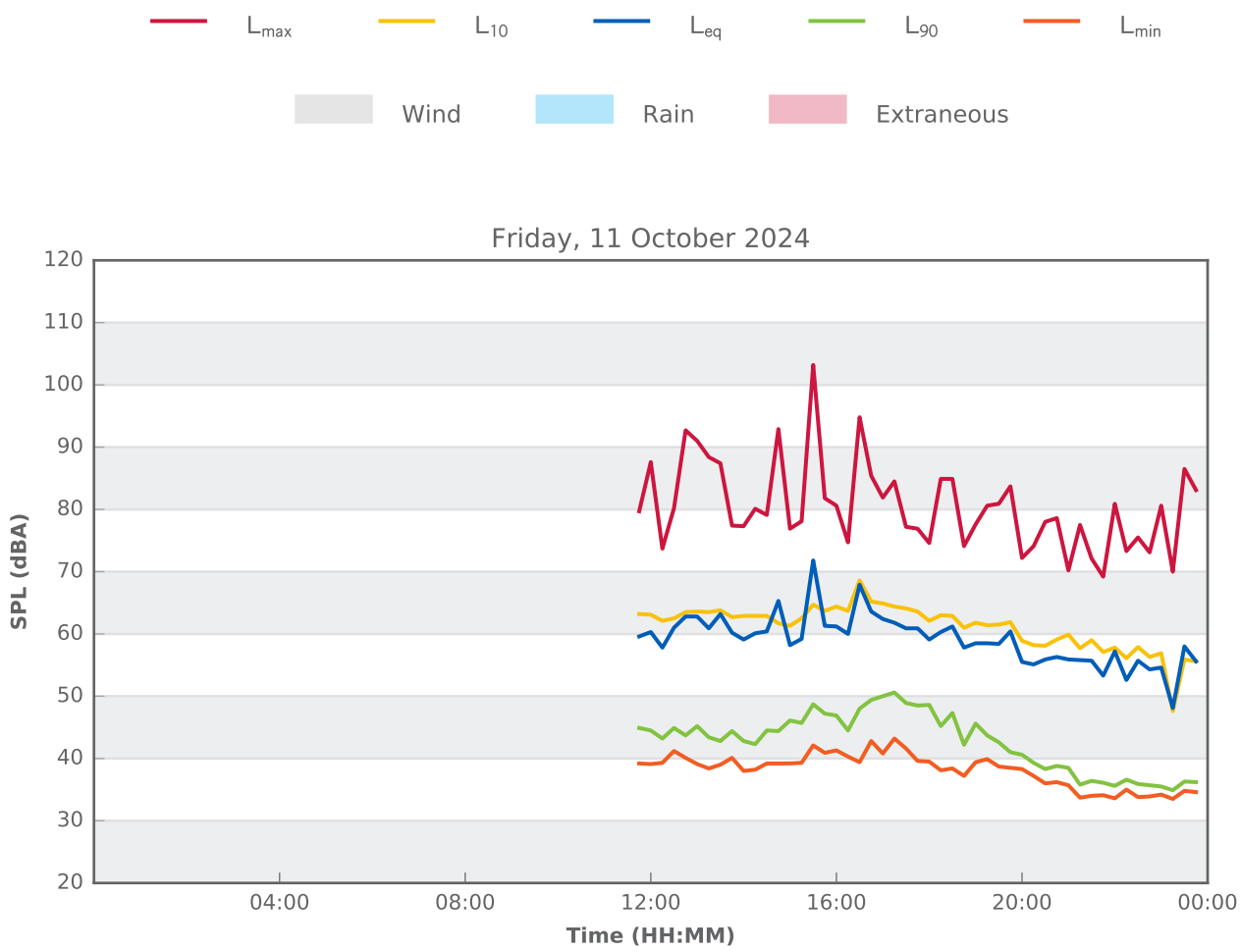

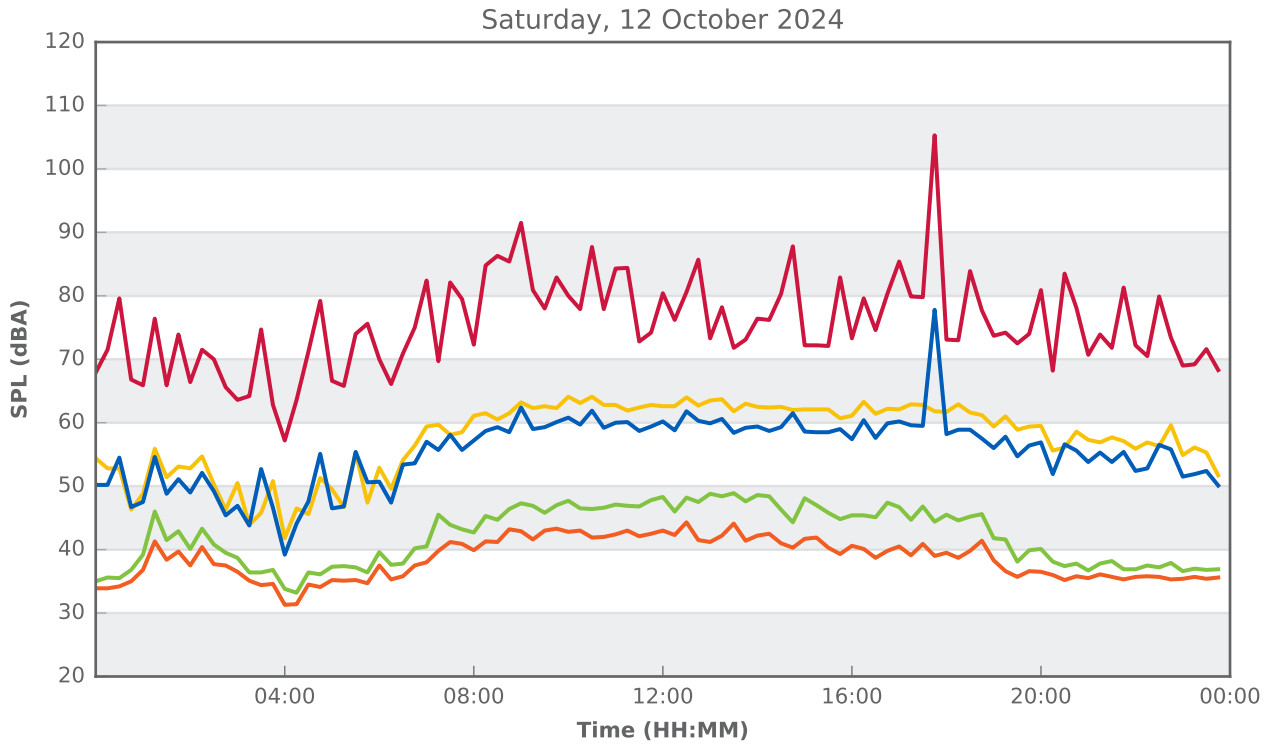

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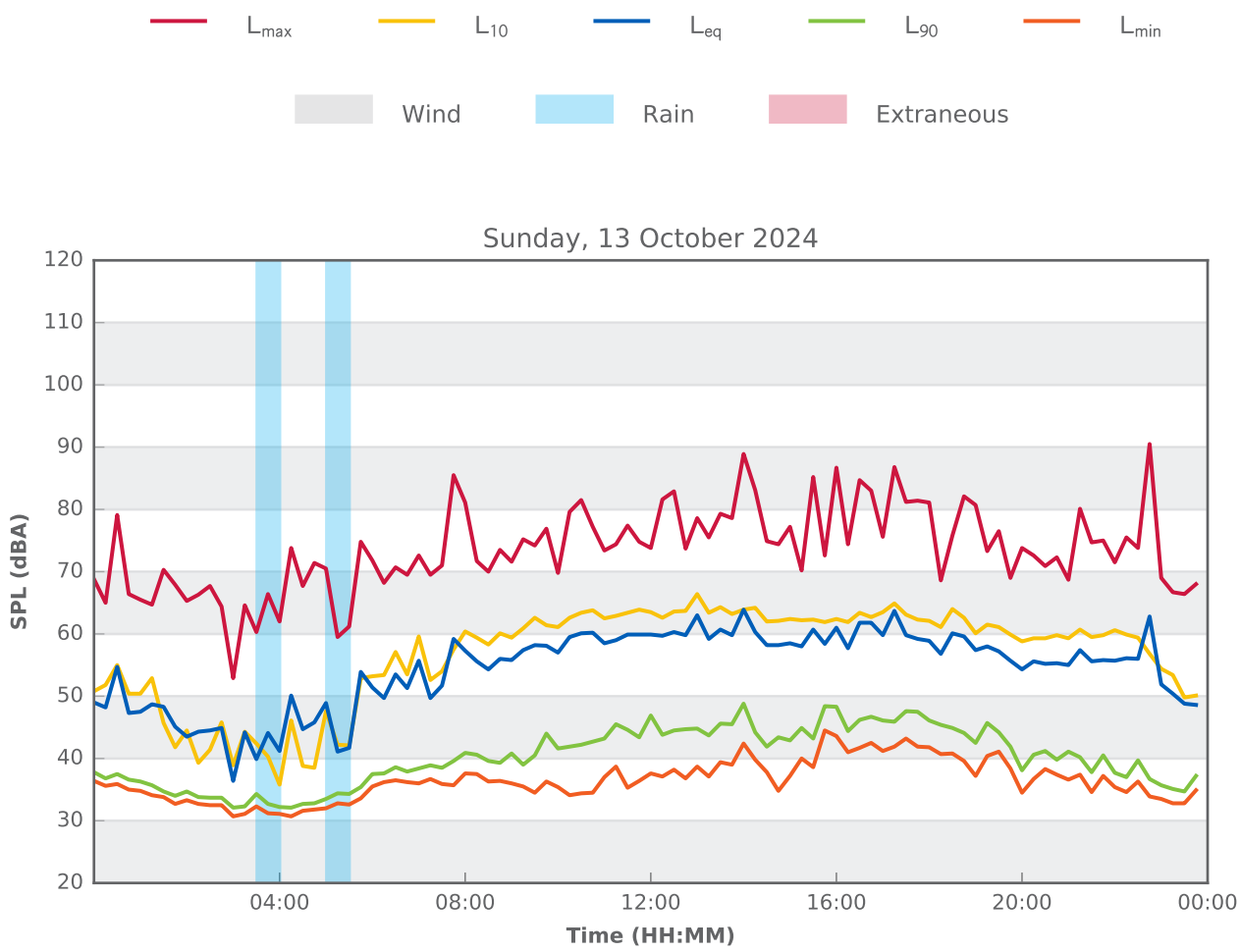

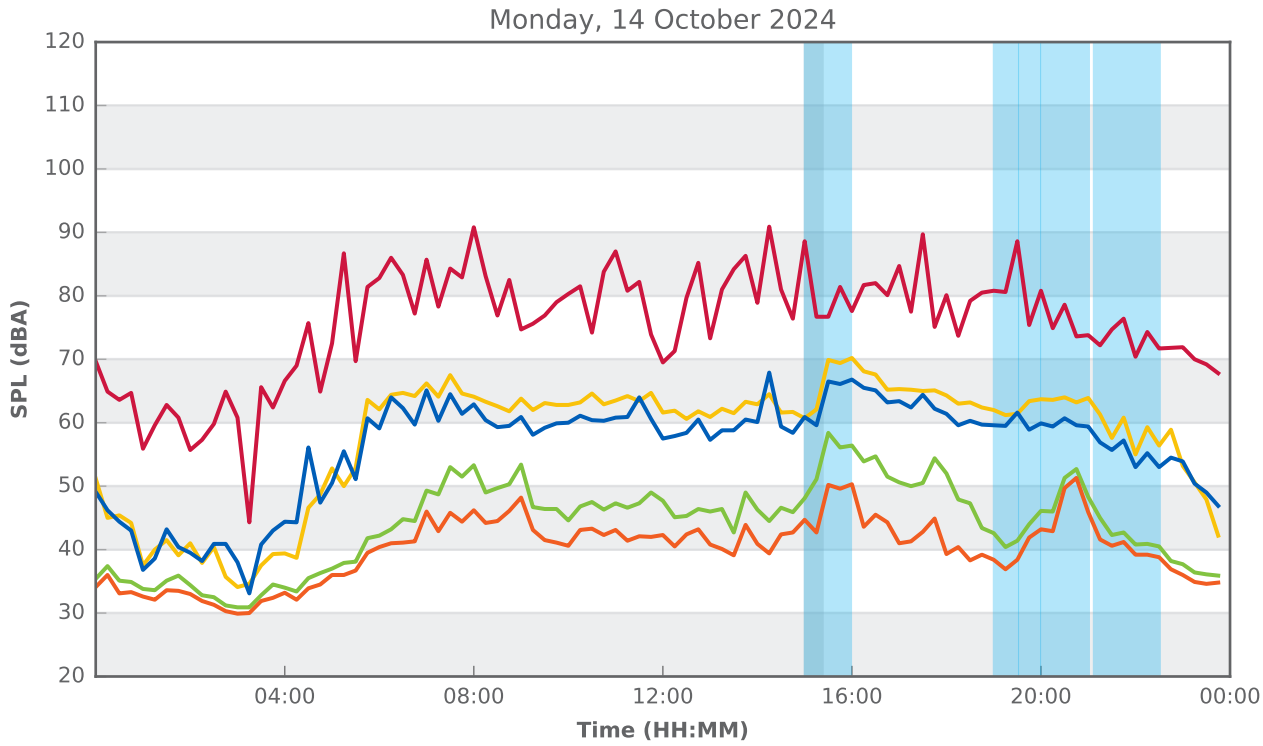

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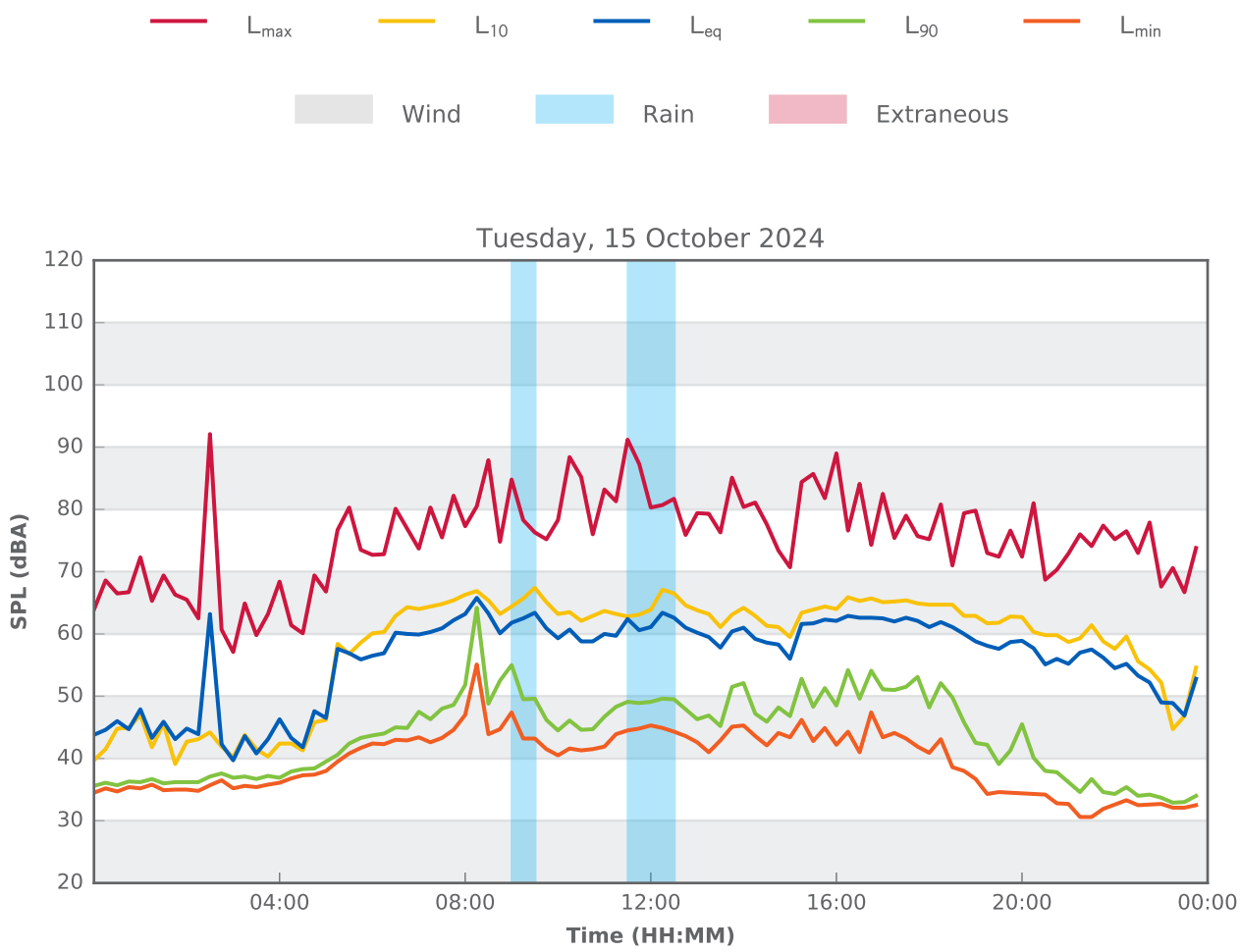

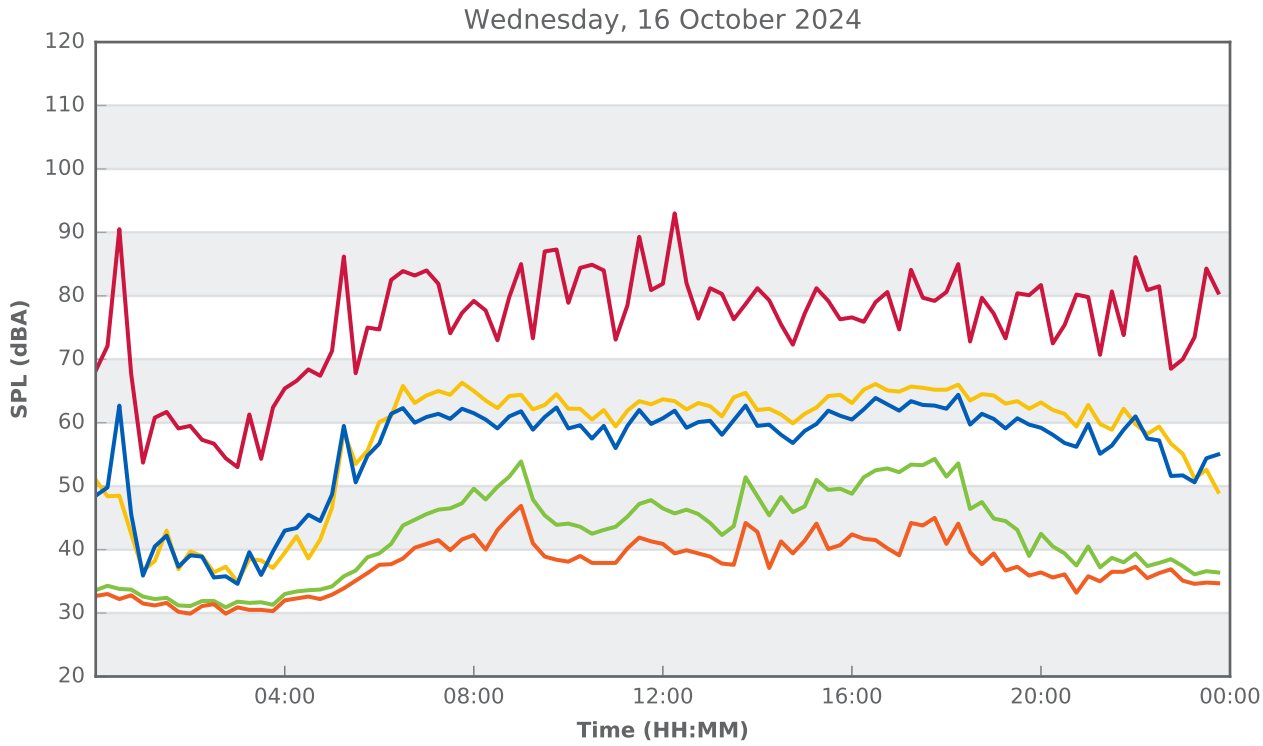

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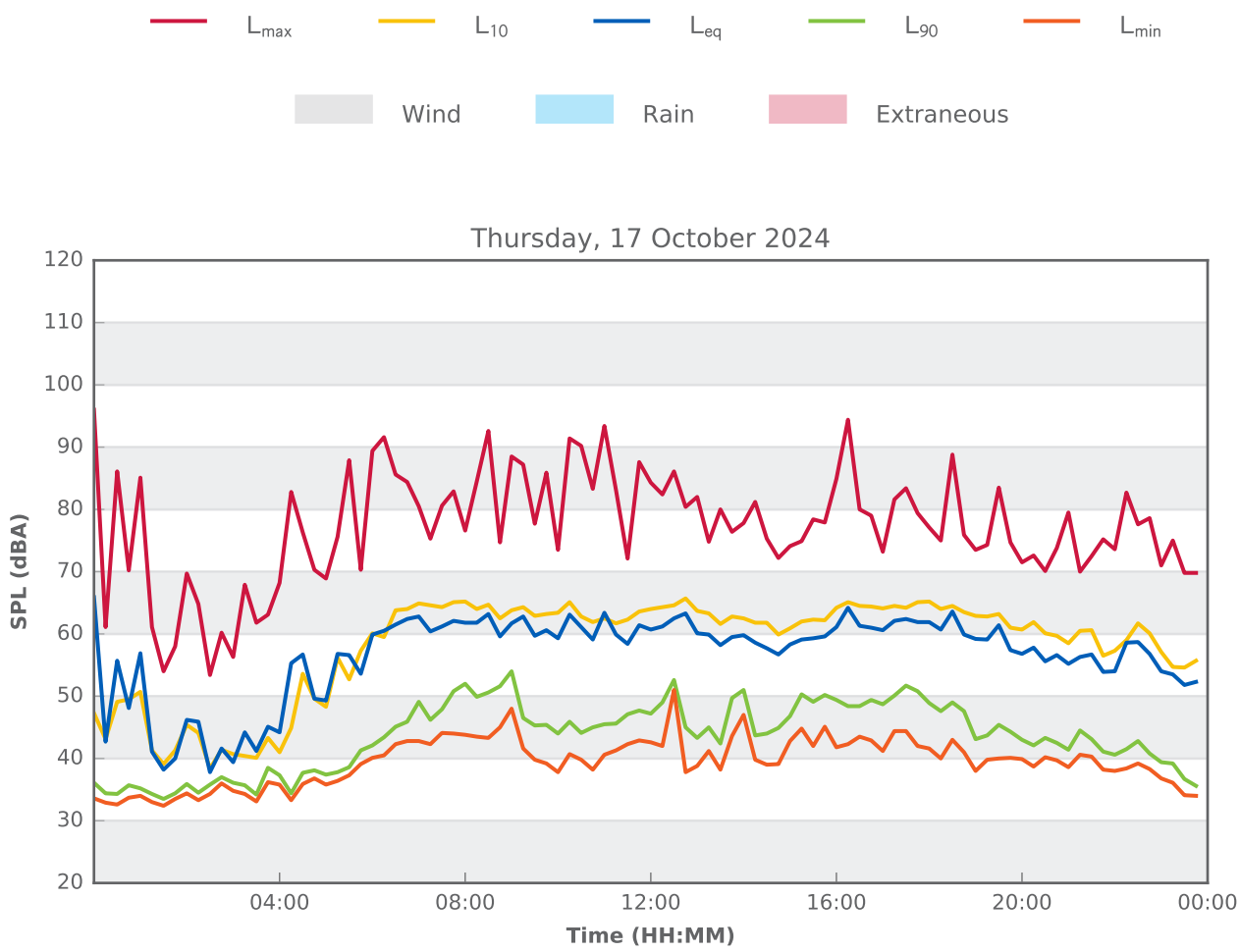

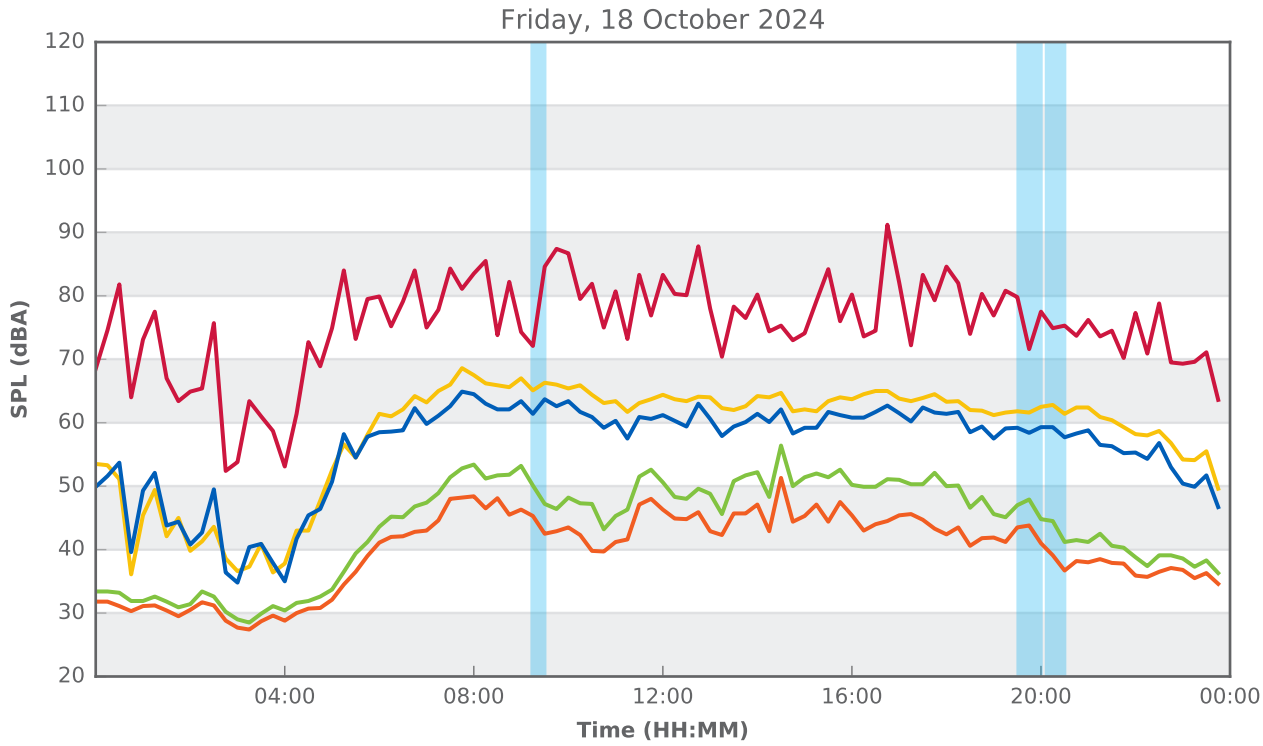

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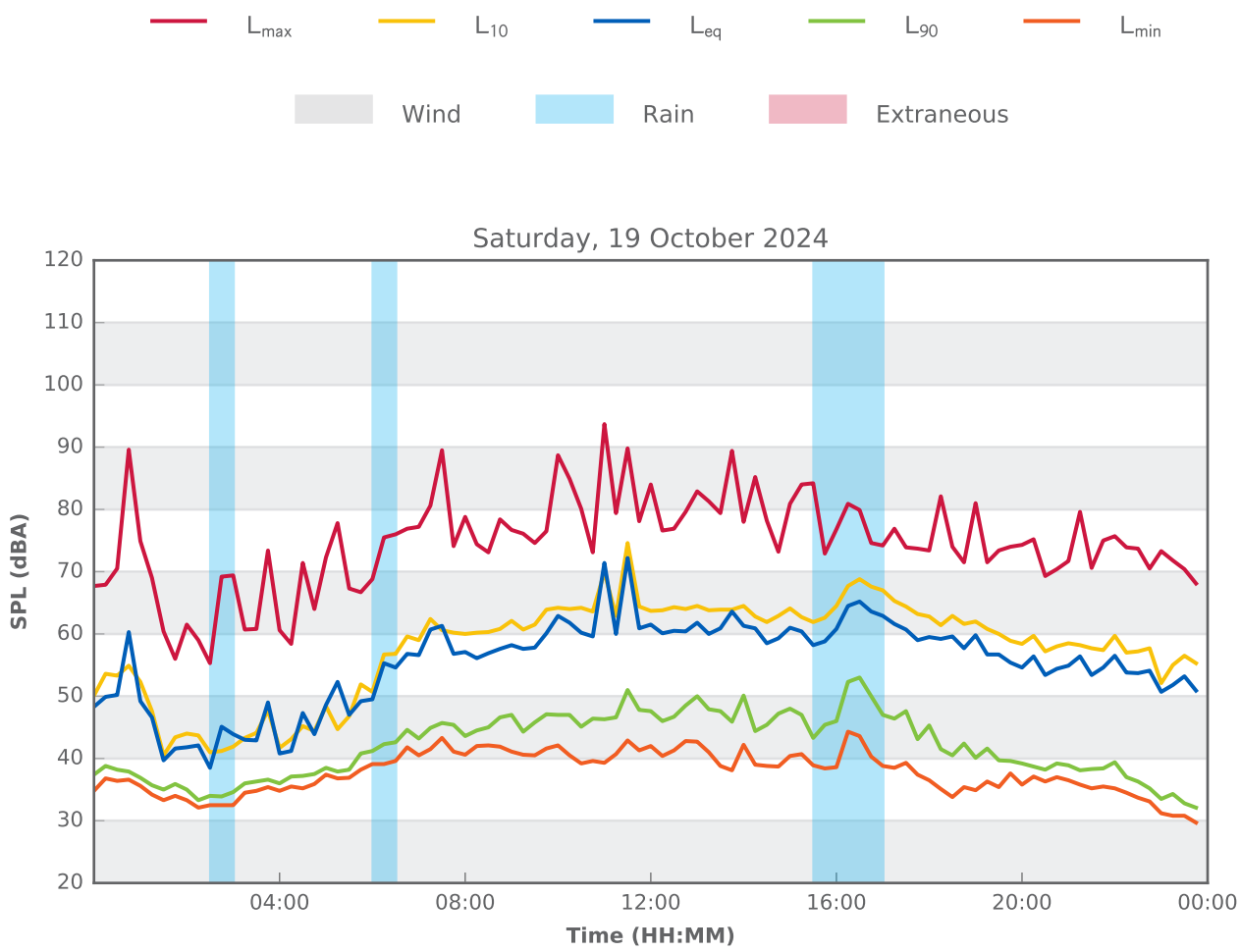

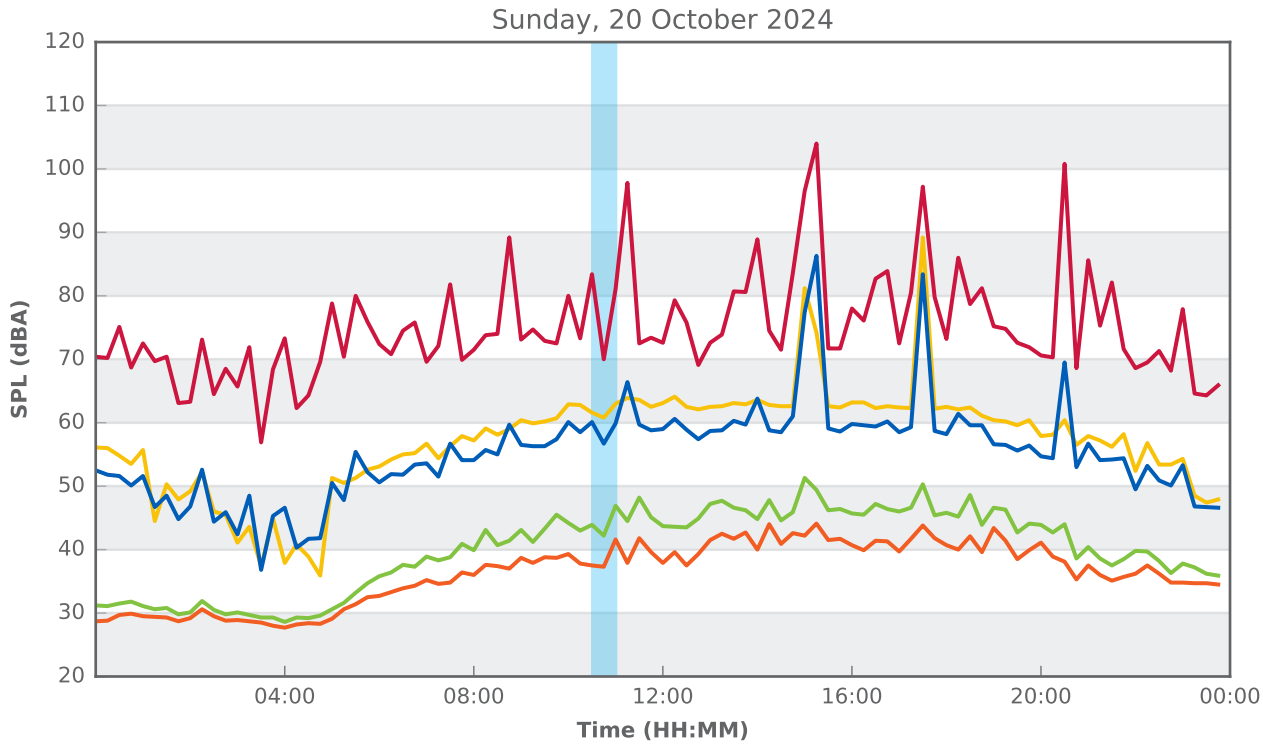

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